



FEMA

FLOOD RISK DISCOVERY REPORT



ELK WATERSHED | WEST VIRGINIA

Braxton County, Webster County, Kanawha County, Nicholas County, Clay County, Pocahontas County, Randolph County, Roane County, City of Charleston, Town of Clendenin, Town of Addison (Webster Springs), Town of Clay, Town of Gassaway, Town of Sutton,










MEETING: May 2, 2023

FINAL REPORT: January 2024

RiskMAP
Increasing Resilience Together

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TABLE OF CONTENTS

 EXECUTIVE SUMMARY.....	3
 PROJECT OVERVIEW	4
 DATA COLLECTION	6
 COMMUNITY CHARACTERISTICS	7
 DISCOVERY MEETING.....	13
 POTENTIAL FLOOD RISK PRODUCTS AND DATASETS.....	14
 SUMMARY AND NEXT STEPS.....	15
 FEDERAL AND STATE PARTNERS.....	16
 APPENDICES	17

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EXECUTIVE SUMMARY

The Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides communities with flood information to help them understand their current flood risk and make informed decisions on actions to become stronger and safer against future risk. Discovery is the first phase of the Risk MAP process and begins a dialogue among FEMA and community members about (1) the nature of flooding in the watershed and the actions that communities are taking to address their flood hazards and risk; and (2) the data and information that may be used for developing the regulatory products and Flood Risk Products (for more information, please see page 14).

This report summarizes the Discovery efforts in the Elk Watershed, which includes eight counties, one city, and five towns. The Discovery phase includes gathering tabular and spatial data and information on past and current flood risk from local communities and regional, State, and Federal entities. See Appendix H for a complete list of the stakeholders involved in Discovery.

The goals of Discovery are to (1) determine what flood hazard information already exists; (2) learn what flood hazard information is still needed to make mitigation decisions; and (3) identify what areas, critical infrastructure, and other resources could potentially be affected during a flood event. This report discusses the risks and needs identified during the Elk Watershed Discovery process.

Highlights of the Discovery effort are listed on the right.

DISCOVERY HIGHLIGHTS:

- New Light Detection and Ranging (LiDAR) data available for this watershed will allow for a dramatic increase in the accuracy of flood hazard mapping.
- All communities in the watershed participate in the National Flood Insurance Program (NFIP).
- The watershed is predominantly comprised of established, rural and suburban areas.
- Participants provided information about ongoing and proposed infrastructure projects including flood control structures that could affect flood hazards.
- Specialized flood risk dashboards were distributed to each community within the four watersheds being studied. These dashboards provide communities with a snapshot of their flood risk as well as their financial risk.



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PROJECT OVERVIEW

The Elk Watershed includes all the land that drains into the Elk River from Snowshoe Mountain Resort in the east to the Capital City of Charleston, West Virginia in the west. FEMA Region III identified the Elk Watershed as a priority for the Risk MAP program because newly available data presented an opportunity to better define flood hazards in the area. This watershed encompasses approximately 1,532 square miles.



COMMUNITY	POPULATION ¹	POPULATION IN WATERSHED ²
BRAXTON COUNTY	12,447	5,700
CITY OF CHARLESTON	48,864	10,100
CLAY COUNTY	8,051	7,600
KANAWHA COUNTY	180,745	54,900
NICHOLAS COUNTY	24,604	4,100
POCAHONTAS COUNTY	7,869	600
RANDOLPH COUNTY	27,932	1,900

COMMUNITY	POPULATION ¹	POPULATION IN WATERSHED ²
ROANE COUNTY	14,208	3,100
TOWN OF CLAY	396	396
TOWN OF CLENDENIN	854	854
TOWN OF GASSAWAY	759	759
TOWN OF SUTTON	863	863
TOWN OF WEBSTER SPRINGS (ADDISON)	731	731
WEBSTER COUNTY	8,378	5,200

¹ All populations are derived from the 2020 Census.

² Population in Watershed estimates are based on the percentage of jurisdiction's area within the watershed.

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YOUR FLOOD RISK MAPPING TIMELINE



● Discovery Meeting
May 2, 2023

NEXT STEPS: REGULATORY STUDY SCOPE DETERMINATION

If the data and research collected and performed during the Discovery phase support the need for a flood map update, the following timeline shows the steps of that process.

	<p>Flood Risk Review</p>	<p>If a flood study is determined to be necessary as a result of the Discovery process, FEMA, State, and local officials will meet to review the draft floodplain mapping and methodologies used.</p>
	<p>Issue Preliminary Map</p>	<p>FEMA issues preliminary maps and Flood Insurance Study (FIS) reports to the community for review.</p>
	<p>Community Coordination and Outreach (CCO)</p>	<p>Preliminary maps are reviewed with community officials at the CCO Meeting. The comment and appeal process are also explained.</p>
	<p>Facilitate Public Comment and Appeal Period</p>	<p>Stakeholders have 90 days after the appeal start date to submit comments and/or appeals. Comments and/or appeals are reviewed, and flood maps may be updated appropriately.</p>
	<p>Issue Letter of Final Determination</p>	<p>Once a flood map is finalized, it is adopted by the community. A six-month adoption period begins to allow communities time to adopt adequate floodplain management ordinances based on the new flood map.</p>
	<p>Manage Your Floodplain</p>	<p>Community leaders monitor and track local development. Letters of Map Revision are required within six months of project completion for projects that change flood hazards in a specific area.</p>

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DATA COLLECTION












Discovery is a process of data mining, collection, and analysis through active collaboration with communities.

FEMA Region III gathered a significant amount of data before the Discovery Meeting to focus community engagement on identifying more localized information and sources of data. Additionally, the Region led the review of the Hazard Mitigation Plans (HMPs), FIS reports, and Comprehensive Plans for each of the jurisdictions prior to the Discovery Meeting.

The Region sent each community and stakeholder a Discovery Data Questionnaire prior to the meeting to collect additional local data such as current land use, zoning plans, risk assessment data, stormwater issues, latest orthophotography, and as-built information for manmade flood retention areas. FEMA also asked communities and stakeholders to identify areas of concern that could be addressed during the flood study through updated flood maps, revised ordinances, and desired mitigation projects.

The data collected were used to produce the Discovery Maps, Community Dashboards, and this Discovery Report. The table on the right provides an overview of the data collected. A complete list of data collected during the Discovery process is included in Appendix E.

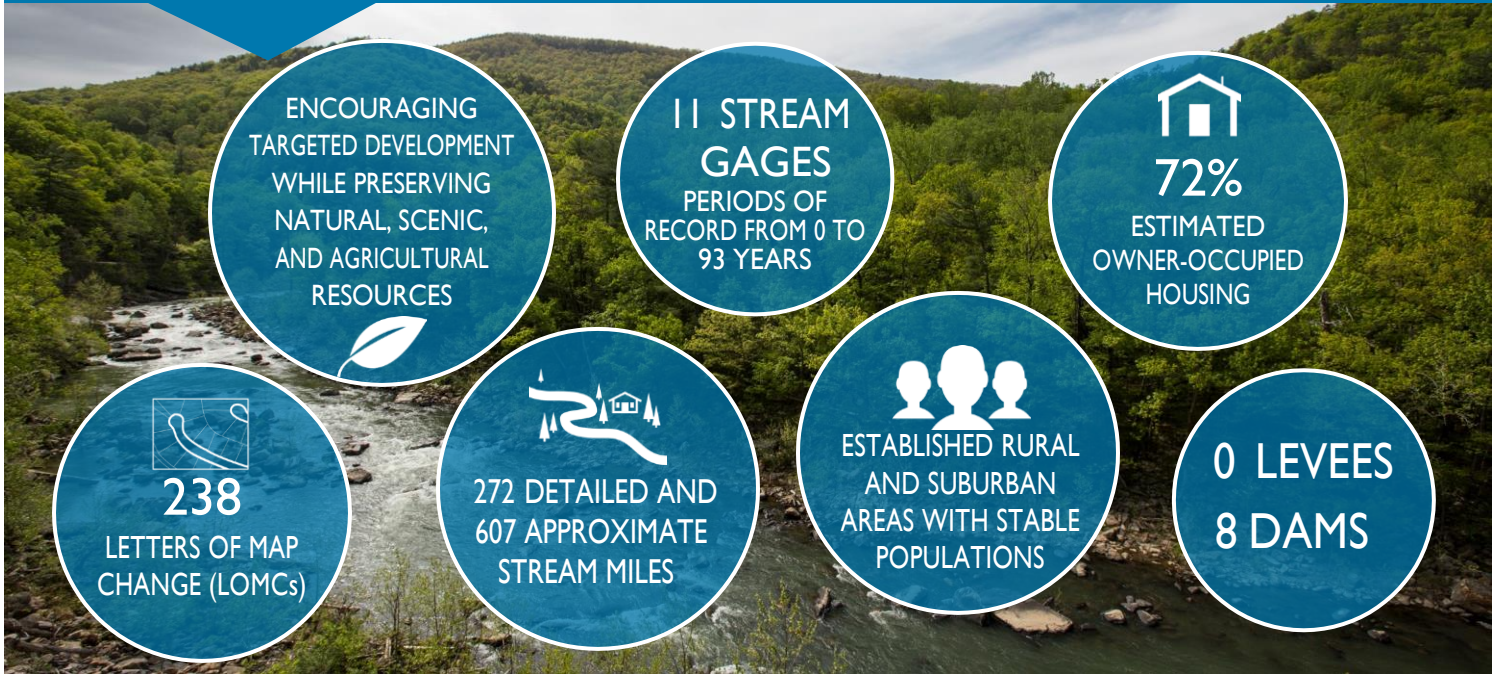


	BASE MAP DATA (political boundaries, streamlines, transportation)
	TOPOGRAPHIC DATA (2018 LiDAR)
	ORTHOPHOTOS (2022 pixel-based)
	DECLARED DISASTERS
	LEVEES, DAMS, STREAM GAGES
	EFFECTIVE FLOODPLAINS
	NFIP & CRS PARTICIPATION
	INDIVIDUAL & PUBLIC ASSISTANCE
	STRUCTURES
	POPULATION & SOCIOECONOMIC CHARACTERISTICS
	MITIGATION ACTIONS

ELK WATERSHED: CHARACTERISTICS

COMMUNITY CHARACTERISTICS

The Elk Watershed community characteristics information was developed to inform the Discovery Meeting and, through the flood risk mapping update, will continue to be used to identify technical assistance and tools that could support the community in its needs. For additional information on community characteristics, please see the Community Dashboards in Appendix A.



ELK WATERSHED COMMUNITY CHARACTERISTICS

The Elk Watershed includes all the land that drains into the Elk River from Snowshoe Mountain Resort in the east to the Capital City of Charleston, West Virginia in the west. The Elk River runs approximately 177 miles through West Virginia before joining the Kanawha River at the City of Charleston, West Virginia. The watershed encompasses approximately 1,532 square miles in Braxton, Clay, Pocahontas, Randolph, Roane, Nicholas, Webster, and Kanawha Counties.

All communities within the Elk Watershed participate in the NFIP. Participating jurisdictions adopt and enforce floodplain management ordinances to implement development standards in flood hazard areas. NFIP regulations represent the minimum standard for floodplain management. Communities are encouraged to consider higher standards and the adoption of more comprehensive regulations, especially when planning for future conditions. These standards can include buffers or setbacks, additional freeboard, regulation of high-risk land uses, conservation and designation of open space areas, and lower thresholds for substantial damage. Higher standards further reduce flood risk and can take advantage of the additional information and knowledge of local conditions available to community officials.

Communities that exceed the minimum requirements of the NFIP may be eligible to participate in the Community Rating System (CRS) program. Two jurisdictions in the Elk Watershed participate in the NFIP's CRS program, including City of Charleston and Kanawha County (Unincorporated areas).

ELK WATERSHED: CHARACTERISTICS

COMMUNITY	TOTAL POLICIES	TOTAL CLAIMS	RL ¹ BUILDINGS	LEVEL OF NFIP REGS REQ'D	EFFECTIVE DATE OF FIRM/FIS	CAV ² / CAC ³ DATES	# OF LOMCS ⁴	TOTAL EXPOSURE IN THE FLOODPLAIN 2.1 ^{4,5}
ADDISON, TOWN OF (WEBSTER SPRINGS)	24	41	0	D	1/6/2012	N/A 12/04/2018	1	\$37,766,366
BRAXTON COUNTY (UNINCORPORATED AREAS)	60	34	5	D	4/19/2010	05/15/1991 12/06/2018	24	\$41,656,346
CHARLESTON, CITY OF	273	354	58	D	2/6/2008	10/21/2010 07/24/2017	7	\$107,915,757
CLAY COUNTY (UNINCORPORATED AREAS)	94	60	5	D	2/6/2013	05/14/2018 08/01/2018	47	\$107,941,081
CLAY, TOWN OF	9	11	0	C	2/6/2013	04/30/1992 10/24/2018	1	\$7,494,532
CLENDENIN, TOWN OF	52	122	14	D	2/6/2008	12/02/2015 10/09/2018	2	\$61,643,788
GASSAWAY, TOWN OF	4	2	0	D	4/19/2010	05/15/1991 12/04/2018	2	\$5,372,970
KANAWHA COUNTY (UNINCORPORATED AREAS)	1207	1585	296	D	2/6/2008	08/18/2014 01/25/2018	107	\$357,024,329
NICHOLAS COUNTY (UNINCORPORATED AREAS)	59	66	2	D	9/24/2021	05/03/2013 07/05/2017	3	\$18,458,842
POCAHONTAS COUNTY (UNINCORPORATED AREAS)	124	155	13	D	11/4/2010	N/A 06/28/2021	3	\$1,305,143
RANDOLPH COUNTY (UNINCORPORATED AREAS)	137	302	43	C	9/29/2010	09/19/2014 10/04/2021	5	\$3,656,790
ROANE COUNTY (UNINCORPORATED AREAS)	90	83	11	D	3/2/2012	N/A 08/22/2017	26	\$25,657,157
SUTTON, TOWN OF	6	5	0	D	4/19/2010	05/15/1991 12/04/2018	5	\$8,000,476
WEBSTER COUNTY (UNINCORPORATED AREAS)	77	140	13	D	5/3/2022	12/04/2018 06/08/2017	5	\$105,647,838

¹ RL=Repetitive Loss, ² CAV=Community Assistance Visits, ³ CAC=Community Assistance Contacts

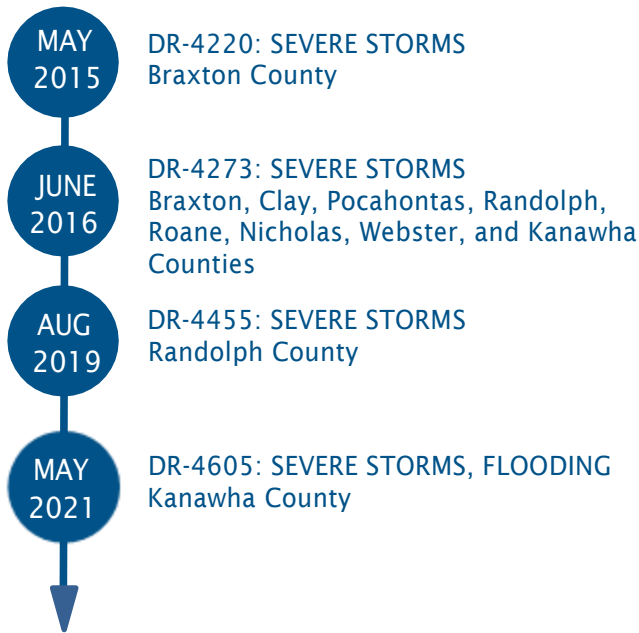
⁴ The number of LOMCs and Total Exposure in Floodplain (TEIF) values are only for areas of these jurisdictions that are located within the Watershed.

⁵ TEIF 2.1 (County Buildings) was created using local Building Footprint Features. Hazus building value data was subsequently dispersed proportionately to the footprints based on the area of the footprint. TEIF is intended to evaluate potential risk or economic loss in a dollar amount per community based on Hazus General Building Stock (Total Exposure) Values from FEMA's Hazus Version 2.2. VGIN building footprints for Quarter #1 of 2016 were utilized, and building duplicates/overlapping buildings were removed prior to distribution of Hazus Building Value.

ELK WATERSHED: CHARACTERISTICS

RECENT FLOOD-RELATED PRESIDENTIAL DISASTER DECLARATIONS (2015-2022)

There are two forms of Presidential action that authorize Federal disaster assistance. Emergency Declarations (EMs) spur activities to protect property and strengthen public safety through Federal assistance, and Major Disaster Declarations (DRs) provide supplemental coordination and assistance beyond the ability of State and local governments.



HISTORY OF FLOOD-RELATED DISASTERS

The following is a list of past major flood events in the Elk Watershed as reported in the effective FIS reports for each jurisdiction.

- September 1861: Severe Storms**
- November 1985: Severe Storms**
- February 2000: Severe Storms**
- June 2001: Severe Storms**
- June 2004: Severe Storms**
- June 2016: Severe Storms**

INDIVIDUAL ASSISTANCE & PUBLIC ASSISTANCE

FEMA grant-funded assistance programs for communities with disaster declarations.

Individual Assistance provides community services or individual or household assistance. Communities in the watershed received approximately \$89.7 million in Individual Assistance funds since 1998. Communities that are ineligible for Individual Assistance, or households and individuals ineligible to receive funds under this program, can work with FEMA Disaster Recovery Centers to identify additional programs for financial assistance.

Public Assistance is separated into seven project categories (A-G). Projects in categories C through G are permanent work projects and are only available for major disasters. Communities in the watershed received approximately \$90.5 million in total public assistance since 1998 (approximately \$55.1 million for categories A and B and \$35.4 million for categories C-G). Funding for these projects is summarized by county below. Project amounts for categories A (debris removal), B(emergency protective measures), and C-G since 1998 are also shown on the Community Dashboards in the Appendix.

COUNTY	C - ROADS & BRIDGES	D - WATER CONTROL FACILITIES	E - PUBLIC BUILDINGS	F - PUBLIC UTILITIES	G - RECREATIONAL OR OTHER
BRAXTON COUNTY	\$94K	\$0	\$57K	\$54K	\$9K
CLAY COUNTY	\$82K	\$0	\$4.5M	\$1.2M	\$5.6M
KANAWHA COUNTY	\$1.6M	\$0	\$6.5M	\$2.4M	\$2.8M
NICHOLAS COUNTY	\$571K	\$3K	\$1.9M	\$1.7M	\$726K
POCAHONTAS COUNTY	\$0	\$0	\$25K	\$0	\$2K

ELK WATERSHED: CHARACTERISTICS

COUNTY	C - ROADS & BRIDGES	D - WATER CONTROL FACILITIES	E – PUBLIC BUILDINGS	F - PUBLIC UTILITIES	G – RECREATIONAL OR OTHER
RANDOLPH COUNTY	\$18K	\$0	\$44K	\$1.8M	\$13K
ROANE COUNTY	\$360K	\$0	\$779K	\$674K	\$52K
WEBSTER COUNTY	\$202K	\$0	\$254K	\$135K	\$1.3M

ELK WATERSHED: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY

BRAXTON COUNTY	<ul style="list-style-type: none"> • The principal flood problems of Braxton County are caused by the overflow of the Little Kanawha River, Oil Creek, Saltlick Creek, and the Elk River. The history of flooding in the county indicates that flooding can occur at any time of the year. Large frontal storms or decaying tropical storms produce the most severe flooding on the larger streams, while high-intensity thunderstorms produce severe flooding on small drainage areas. Major floods have occurred in the county in 1918, 1926, 1932, 1939, 1967, and 1985. • The mountainous topography of the county is conducive to rapid rises in water-surface elevation on streams and to fast runoff, best described as flash flooding. This condition has been aggravated by activities such as timbering.
NICHOLAS COUNTY	<ul style="list-style-type: none"> • Past flooding on the streams within Nicholas County indicates that flooding can occur during any season of the year, although the main flood season is usually December through April. Most of the floods that occur during this period are the result of heavy rain and snowmelt. However, floods may occur at any time due to periods of heavy rainfall. Such floods on the Cherry River are known to have occurred in July 1931; June 1940; July 1954; and August 1969. • The floods of June 23 and 24, 2016 devastated many communities across West Virginia, including Nicholas County and the City of Richwood. Repeated rounds of torrential thunderstorms dumped more than 9 inches of rain in the hardest hit areas of West Virginia, causing the third deadliest flood event in state history with millions of dollars in damage to infrastructure and economic resources. While this flood event seemed to West Virginia residents to be an extremely unusual event, research by the United States Geological Survey and the Federal Emergency Management Agency suggests otherwise. It is critical to understand the June 2016 event so that West Virginia communities can take action to be safer in the future.
POCAHONTAS COUNTY	<ul style="list-style-type: none"> • The principal flood problems of Pocahontas County are the overflows of Deer Creek, East Fork Greenbrier River, Greenbrier River, and Knapp Creek. The history of flooding in the county indicates that flooding can occur at any time of the year. Large frontal storms or decaying tropical storms produce the worst flooding on the larger streams, while high intensity thunderstorms produce severe flooding on streams with smaller drainage areas. The flood of record occurred in November 1985, with a recurrence interval of greater than the expected 1-percent-annual chance flood discharge at all USGS stream gaging stations in the county.
RANDOLPH COUNTY	<ul style="list-style-type: none"> • Major floods may occur on the Tygart Valley River at various times of the year. Flood occurring in the winter months are usually the result of heavy rainfall and snowmelt. Floods occurring during other times of the year are the result of high intensity, short-duration storms or from major tropical storms. • The maximum known flood on the Tygart Valley River occurred on November 5, 1985, with a peak flood flow of 28,000 cubic feet per second (cfs) at the USGS gage located in Elkins. This flood has a computed recurrence interval greater than the 1-percent-annual-chance flood.
ROANE COUNTY	<ul style="list-style-type: none"> • Main flood season typically lasts from December through April and most of the floods occurring in this season are the result of heavy rain and snowmelt. • Flooding may occur on Bens Run, a small tributary of Spring Creek, but is not expected to be as serious as the flooding in the Goff Run, Spring Creek, or Tanner Run floodplains as it has a drainage area of 0.40 miles. The floods in those areas occur periodically in the City of Spencer and generally causes more severe flooding on the lower reaches. • Floods caused by overflow of Reedy Creek occur periodically in Town of Reedy. The most recent significant flood that caused structural damage occurred in 2000.

ELK WATERSHED: CHARACTERISTICS

PRINCIPAL FLOOD PROBLEMS BY COUNTY

<p>CLAY COUNTY</p>	<ul style="list-style-type: none"> • The principal flood problems of Clay County are the overflows of the Elk River, Laurel Creek, Middle Creek, and Big Otter Creek. The history of flooding in the county indicates that flooding can occur at any time of the year although the main flood season is usually December through April. Large frontal storms or decaying tropical storms produce the worst flooding on the larger streams, while high-intensity thunderstorms produce severe flooding on smaller drainage areas. Major floods have occurred in the county in 1918, 1926, 1932, 1939, 1967, and 1985. There are USGS gages located on the Elk River near Frametown, at the town of Clay, and at Queen Shoals.
<p>WEBSTER COUNTY</p>	<ul style="list-style-type: none"> • The principal flood problems of Webster County are the overflows of the Birch River, the Left Fork Holly River, Hodam Creek, the Right Fork Holly River, Laurel Creek, the Elk River, the Back Fork Elk River, Leatherwood Creek, the Gauley River, Big Ditch Run, the Williams River, Grassy Creek, Strouds Creek, Sugar Creek, and Price Glade Run. The history of flooding in the county indicates that flooding can happen at any time of the year. Large frontal storms or decaying tropical storms produce the worst flooding on the larger streams, while high intensity thunderstorms produce severe flooding on smaller drainage areas. Major floods have occurred in the county in 1861, 1896, and 1985. • The mountainous topography of the county is conducive to rapid rises on streams and also to fast runoff best described as flash flooding. This condition has been aggravated by man’s activities in the county, such as mining and timbering. • The floods of June 23 and 24, 2016, devastated many communities across West Virginia and Webster County. Repeated rounds of torrential thunderstorms dumped more than 9 inches of rain in the hardest hit areas of West Virginia, causing the third deadliest flood event in state history with millions of dollars in damage to infrastructure and economic resources. While this flood event seemed to West Virginia residents to be an extremely unusual event, research by the United States Geological Survey and the Federal Emergency Management Agency suggests otherwise. It is critical to understand the June 2016 event so that West Virginia communities can take action to be safer in the future.
<p>KANAWHA COUNTY</p>	<ul style="list-style-type: none"> • Portions of Kanawha County along the Kanawha River and its tributaries are subject to frequent flooding. The principal result is the flooding of basements, garages, lawns, and gardens, and a deposit of mud, filth, and refuse. Street and highway travel is disrupted, which causes the temporary loss of police, fire, and medical protection. • In July 1998, severe storms caused flooding in western West Virginia resulting in major damage to private property. In February 2000, severe winter storms caused flooding in parts of western West Virginia which also caused major damage to private property. In June 2001, severe storms caused flooding and landslides in parts of southern West Virginia. Southwestern West Virginia was again hit with thunderstorms and subsequent flash flooding in June 2004. The July 1998, February 2000, June 2001 and June 2004 events all resulted in Presidential Disaster declarations for Kanawha County. • The flood of record on the Kanawha River and the Elk River occurred in September 1861. The U.S. Weather Bureau gage at river mile 58.5 on the Kanawha River reached an elevation of 605.5 feet, 5.3 feet higher than the second-highest flood of record at Charleston, which occurred in September 1878 (USACE 1958). The 1861 flood was approximately 1.5 feet lower than the 100- year flood under natural conditions and 9.5 feet higher than the 100-year flood under current modified conditions.

ELK WATERSHED: CHARACTERISTICS

HAZARD MITIGATION PLANS

FEMA provides communities with resources to help them integrate the flood risk assessment data into their ongoing planning processes, including hazard mitigation planning. Information about the status of HMPs in the Elk Watershed is provided in the table below. For more information about mitigation actions identified by each community in these plans, please see the Community Dashboards included in the Appendix.

COMMUNITY	HAZARD MITIGATION PLAN	STATUS
KANAWHA COUNTY	Planning and Development Council Region 3 Hazard Mitigation Plan	Expired 5/22/2022 Plan in Progress
TOWN OF CLENDENIN		
CITY OF CHARLESTON		
CLAY COUNTY		
TOWN OF CLAY		
POCAHONTAS COUNTY	Planning and Development Council Region 4 Hazard Mitigation Plan	Expired 2/21/2022 Plan in Progress
NICHOLAS COUNTY		
WEBSTER COUNTY		
TOWN OF ADDISON		
ROANE COUNTY	Planning and Development Council Region 5 Hazard Mitigation Plan	Expired 12/4/2021 Plan in Progress
BRAXTON COUNTY	Planning and Development Council Region 7 Hazard Mitigation Plan	Approved Expires 7/4/2023
RANDOLPH COUNTY		
TOWN OF GASSAWAY		
TOWN OF SUTTON		

HAZARD MITIGATION ASSISTANCE

FEMA administers three **Hazard Mitigation Assistance (HMA)** programs to provide funding for projects that reduce the risk to individuals and property from natural hazards.

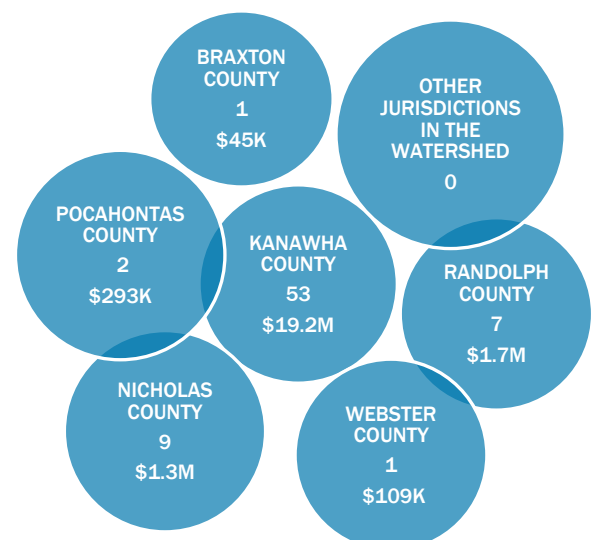
Hazard Mitigation Grant Program (HMGP): Funding to implement long-term hazard mitigation planning and projects after a Presidential Major Disaster Declaration.

Pre-Disaster Mitigation (PDM): Funding to implement hazard mitigation planning and projects that prevent future losses before disaster strikes.

Flood Mitigation Assistance (FMA): Funding to implement planning and projects that reduce or eliminate long-term risk of flood damage to structures insured under the NFIP.

A summary of HMA grants received by county is provided to the right.

HMA GRANTS RECEIVED

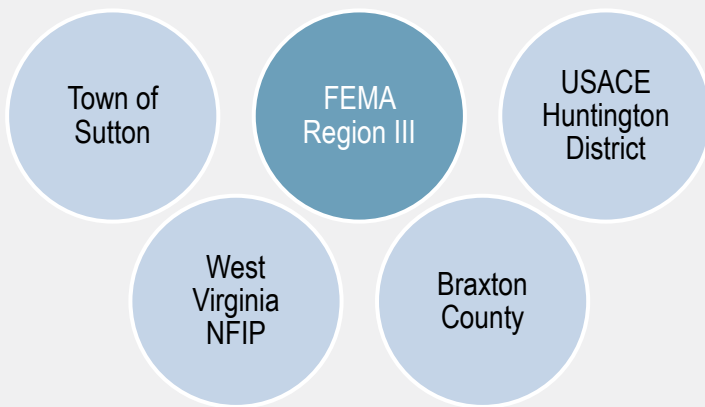


ELK WATERSHED | WEST VIRGINIA

DISCOVERY MEETING

The Discovery Meeting is an opportunity for FEMA to engage directly with the communities in the study watershed. The meeting serves both to introduce communities to the flood risk mapping process and to gather information on local concerns, resources, and needs.

A Discovery Meeting was conducted for Elk Watershed on May 2, 2023. Representatives of the following communities and agencies attended the meeting:



During the meeting, attendees were asked to provide information on areas of local concern, past risk assessment and mitigation projects, and future risk assessment and mitigation needs. Meeting attendees discussed their priorities with the project team and participated in a mapping exercise to provide information on specific reaches, contributing areas, and structures. Meeting invitees also received questionnaires designed to gather information on local resources, flood hazards, and mapping and mitigation priorities.

Discovery Meeting outcomes based on the meeting, mapping exercise, and questionnaires are summarized on the right.

The Discovery Map comments and Discovery Meeting minutes are included in Appendices F and G, respectively.

MAP UPDATES REQUESTED:

- The WV GIS Technical Center, part of West Virginia University, evaluated Approximate A Zone rivers/streams in the Kanawha River Basin to be recommended for more comprehensive Detailed Flood Studies based on clusters of buildings with high flood damage potential.

The WV GIS Technical Center published this information in a 2023 report which is included in Appendix J of this Discovery Report.

FLOOD RISK CONCERNS:




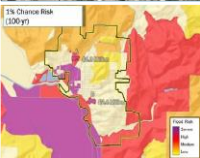


- Beyond the data analysis shared by the WV GIS Technical Center, no community comments regarding flood concerns were offered during the Elk Discovery Meeting or associated comment period.

ELK WATERSHED | WEST VIRGINIA

POTENTIAL FLOOD RISK PRODUCTS AND DATASETS

Based on the findings of the Discovery process, FEMA Region III will consider a potential flood risk mapping project within the Elk Watershed. FEMA Region III will explore the possibility of studying all riverine areas or a project studying limited stream reaches within the watershed.

A flood risk mapping project takes about three to five years to complete. When it is final, communities are provided with an updated Flood Insurance Rate Map (FIRM), FIS reports, and FIRM databases, also known as Flood Hazard Products. Additionally, communities may receive a set of non-regulatory tools that they can use to better understand and make informed decisions to reduce risk. The following non-regulatory products may be delivered to the communities at the end of a project.

FLOOD RISK PRODUCT	WHAT IS IT?	HOW IS IT USED?
 <p>FLOOD RISK MAP</p>	<p>Illustrates overall flood risk within the project area by including the outcomes of assessments completed during the flood risk mapping project.</p>	<p>Can be used by communities as outreach tools to communicate risk to residents more clearly.</p>
 <p>FLOOD RISK DATABASE</p>	<p>Provides communities with geospatial information collected during the risk assessment process and offers effective ways to visualize and communicate flood risk. Four datasets are included.</p>	
 <p>1. Changes Since Last FIRM</p>	<p>Highlights how the latest FIRM differs from the previous maps to help communities understand the changes and prepare for adoption of new maps.</p>	<p>Communities can use this to engage residents and businesses about their changing risk and the implications for flood insurance.</p>
 <p>2. Flood Risk Assessment</p>	<p>Focuses on damage that results from floods of various magnitudes. Identifies flood-prone areas and vulnerable populations and property and provides an estimate of potential losses.</p>	<p>Can help guide community mitigation efforts by highlighting areas where risk reduction actions may produce the most effective results.</p>
 <p>3. Flood Depth and Analysis Grid</p>	<p>Communicates detailed information about the depth and velocity of floodwaters, as well as the probability of an area being flooded over time.</p>	<p>Officials can use depth grids to show individuals the depth of flooding their home might experience at different flood frequencies.</p>
 <p>4. Areas of Mitigation Interest</p>	<p>Explains how various physical factors affect the severity of flooding.</p>	<p>Information can be tied to the local HMP, which can help projects gain traction and help officials secure funding for those projects.</p>

ELK WATERSHED | WEST VIRGINIA

SUMMARY AND NEXT STEPS

SUMMARY

As the first phase of a flood risk mapping project, Discovery helps commence a coordinated effort within the Elk Watershed to ensure communities have information to improve their risk reduction efforts, including their hazard mitigation planning, mitigation action identification and implementation, and community outreach. The findings from the Elk Watershed Discovery Report and Maps are based on an analysis of watershed-wide research, information provided by watershed communities and stakeholders, and input from meetings and engagement with the communities and stakeholders. This process and the resulting report and maps serve as the first step toward increasing communities' resilience to flooding within the Elk Watershed. The coordination with communities in the watershed and the detailed study of flooding within those communities will continue at the outset of a flood risk mapping project in the Elk Watershed.

ACTION ITEMS AND NEXT STEPS

- Communities will provide feedback to FEMA on training and technical assistance needs.
- FEMA will have follow-up discussions with communities to discuss next steps in the flood risk mapping process should the data and research collected and performed during Discovery support the need for an update.
- Communities should continue to explore ideas to increase their resilience to flooding, such as cost-efficient mitigation projects and integration with hazard mitigation planning.
- Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
- Communities should stay in contact with FEMA for any additional mapping and public assistance needs.

QUESTIONS

If you have any questions, please contact the FEMA Region 3 Project Manager, Robert Pierson, at Robert.Pierson@fema.dhs.gov.

ELK WATERSHED | WEST VIRGINIA

FEDERAL AND STATE CONTACT INFORMATION

AGENCY	NAME	TITLE	EMAIL
YOUR PRIMARY FEMA CONTACT	ROBERT PIERSON	FEMA Region 3 Project Manager	Robert.Pierson@fema.dhs.gov
FEMA REGION 3	ELIZABETH RANSON	FEMA Region 3 Floodplain Management Specialist	Elizabeth.ranson@fema.dhs.gov
WEST VIRGINIA EMERGENCY MANAGEMENT	TIMOTHY W. KEATON	WV NFIP/CTP Coordinator	Tim.w.keaton@wv.gov
WEST VIRGINIA GIS TECHNICAL CENTER	KURT DONALDSON	Project Manager	Kurt.Donaldson@mail.wvu.edu

APPENDICES

- A. Community Dashboards
- B. Acronyms and Abbreviations
- C. References
- D. Glossary
- E. Additional Data
 - a. Data Collection for the Elk Watershed
 - b. List of Topographic Data Sources by County
 - c. Results of CNMS Showing Flood Study Validity
 - d. Dams in the Watershed by County
 - e. Levees in the Watershed by County
 - f. Stream Gage Information
 - g. County Border Special Flood Hazard Area Floodplain Boundary Tie-In Issues
 - h. LOMCs Identified in the Watershed by Jurisdiction
- F. Discovery Maps
- G. Meeting Minutes
- H. Meeting Attendance Record
- I. Meeting Presentation
- J. WV GIS Technical Center – Zone A Building Cluster Analysis for Kanawha Basin Watersheds

APPENDIX A | COMMUNITY DASHBOARDS

Braxton County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



¹ Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

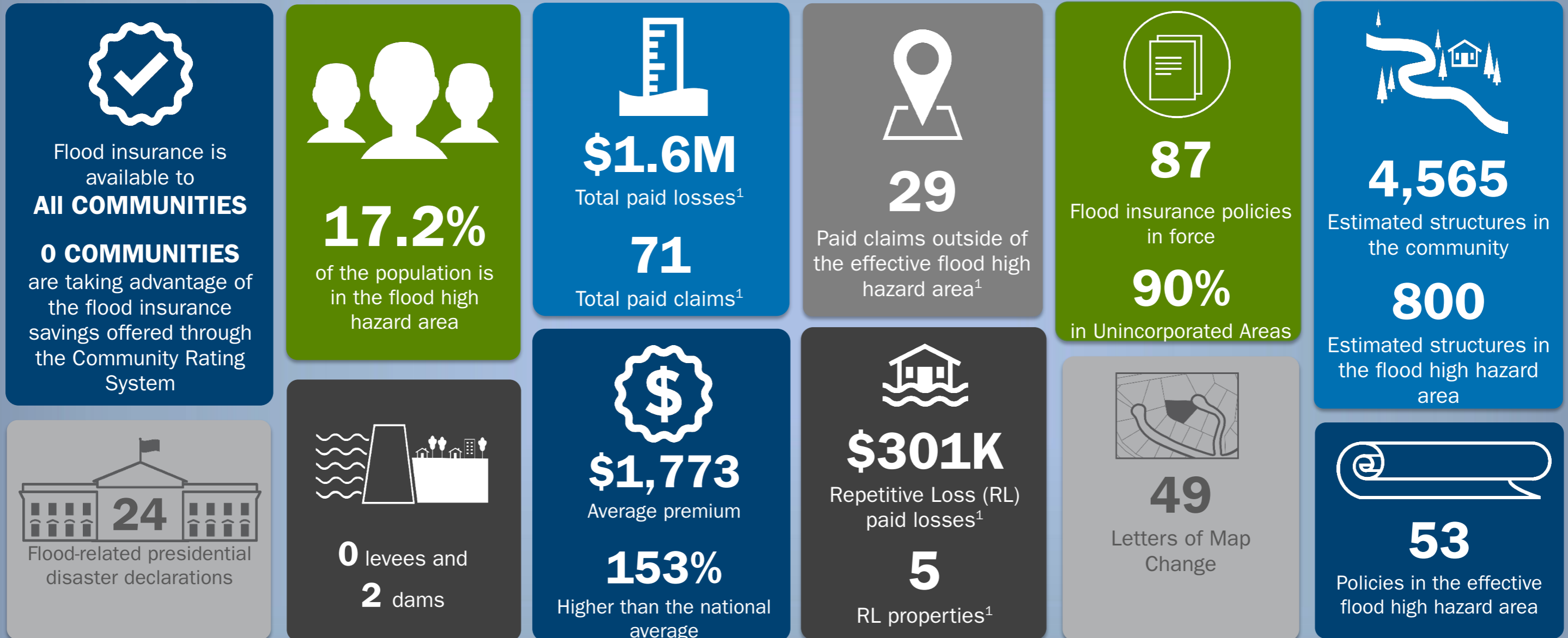
KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Clay County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



¹ Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline





FEMA

Mingo County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



Flood insurance is available to **All Communities**

0 Communities are taking advantage of the flood insurance savings offered through the Community Rating System




23.1% of the population is in the flood high hazard area




\$30.2M Total paid losses¹

1,741 Total paid claims¹



281 Paid claims outside of the effective flood high hazard area¹



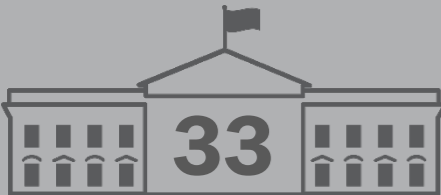
349 Flood insurance policies in force

77% in Unincorporated Areas




12,505 Estimated structures in the community

3,045 Estimated structures in the flood high hazard area



33 Flood-related presidential disaster declarations



4 levees and **10** dams




\$686 Average premium

2% Lower than the national average



\$7.1M Repetitive Loss (RL) paid losses¹

197 RL properties¹



41 Letters of Map Change



234 Policies in the effective flood high hazard area

¹ Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline





FEMA

Pocahontas County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



Flood insurance is available to **3 COMMUNITIES**

0 COMMUNITIES are taking advantage of the flood insurance savings offered through the Community Rating System




10.6% of the population is in the flood high hazard area



\$15.7M Total paid losses¹

747 Total paid claims¹



20 Paid claims outside of the effective flood high hazard area¹



223 Flood insurance policies in force

50% in Town of Marlinton




9,515 Estimated structures in the community

905 Estimated structures in the flood high hazard area



22 Flood-related presidential disaster declarations



0 levees and **8** dams




\$1,463 Average premium

108% Higher than the national average




\$9.1M Repetitive Loss (RL) paid losses¹

167 RL properties¹



11 Letters of Map Change



156 Policies in the effective flood high hazard area

¹ Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline





FEMA

Randolph County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



Flood insurance is available to **All Communities**

0 Communities are taking advantage of the flood insurance savings offered through the Community Rating System




9.9% of the population is in the flood high hazard area



\$4.8M Total paid losses¹

547 Total paid claims¹



134 Paid claims outside of the effective flood high hazard area¹



189 Flood insurance policies in force

65% in Unincorporated Areas




17,350 Estimated structures in the community

1,995 Estimated structures in the flood high hazard area



21 Flood-related presidential disaster declarations



1 levee and **6** dams




\$1,049 Average premium

49% Higher than the national average




\$2.7M Repetitive Loss (RL) paid losses¹

92 RL properties¹



98 Letters of Map Change



119 Policies in the effective flood high hazard area

¹ Since 1978

Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline





FEMA

Webster County, WV– Countywide

FEMA’s Risk Mapping, Assessment, and Planning (Risk MAP) Program helps strengthen communities by identifying actions they can take now to reduce their hazard risk, enhancing local planning, improving outreach through risk communications, and increasing local resilience to natural hazards.

The information presented below are estimates as of August 2022.



Flood insurance is available to **All Communities**

0 Communities are taking advantage of the flood insurance savings offered through the Community Rating System



18.1% of the population is in the flood high hazard area



\$2.5M Total paid losses¹

208 Total paid claims¹



56 Paid claims outside of the effective flood high hazard area¹



95 Flood insurance policies in force

73% in Unincorporated Areas




5,780 Estimated structures in the community

1,215 Estimated structures in the flood high hazard area



22 Flood-related presidential disaster declarations



0 levees and **4** dams




\$1,816 Average premium

159% Higher than the national average




\$551K Repetitive Loss (RL) paid losses¹

18 RL properties¹



7 Letters of Map Change



63 Policies in the effective flood high hazard area

¹ Since 1978

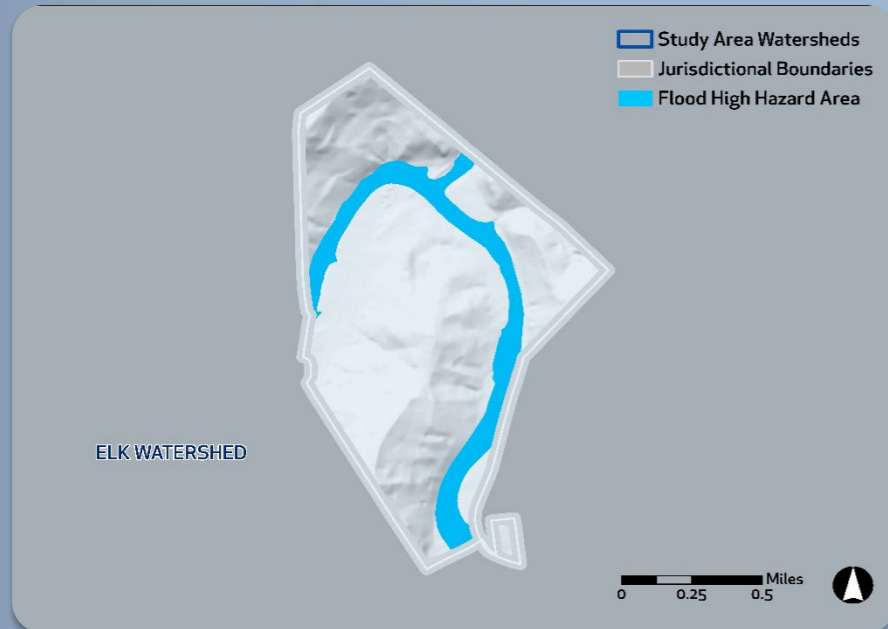
Note: For the National Flood Insurance Program data provided above, the county totals include figures from incorporated and unincorporated areas.

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Gassaway/Braxton County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



04/19/2010
Initial FIRM¹ date

04/19/2010
Effective FIRM date

\$33K
Total paid losses²

2
Total paid claims²

4
Flood insurance policies in force

3
Policies in the effective flood high hazard area

380
Estimated structures in the community

40
Estimated structures in the flood high hazard area

2
Letters of Map Change

23
Flood-related countywide presidential disaster declarations

0
Paid claims outside of the effective flood high hazard area²

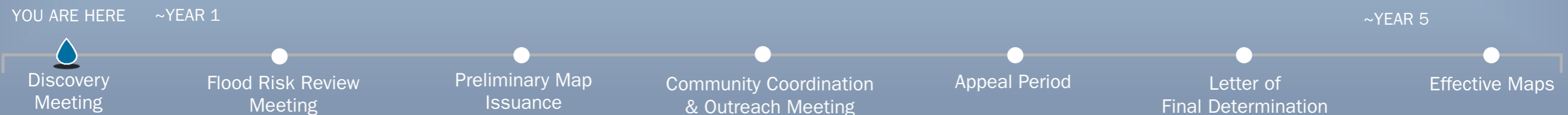
\$0
Repetitive Loss (RL) paid losses²

0
RL properties²

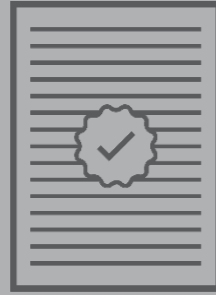
19%
of households spend 30% or more of their income on housing

7%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Gassaway/Braxton, WV



Your Hazard Mitigation Plan has been approved through **July 4, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Participate in acquisition and demolition, relocation, mitigation reconstruction and elevation.
- Continue to work with county floodplain coordinator to update municipal floodplain ordinance.
- Continue to make permitting necessary before any new construction is allowed. Permitting should be made to work with any/all floodplain ordinances.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

**Land Use Trend:
Small Town**

05/15/1991
Date of Last CAV⁴

12/04/2018
Date of Last CAC⁴

PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System

Countywide Public
Assistance received

\$7K
Category A: Debris
Removal

\$52K
Category B: Protective
Measures

\$214K
Categories C-G: Permanent
Work

Hazard Mitigation
Assistance Projects
Countywide

1
Hazard Mitigation Grant
Program

0
Pre-Disaster
Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Sutton/Braxton County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



04/19/2010
Initial FIRM¹ date

04/19/2010
Effective FIRM date

\$5K
Total paid losses²

5
Total paid claims²

4
Flood insurance policies in force

4
Policies in the effective flood high hazard area

465
Estimated structures in the community

40
Estimated structures in the flood high hazard area

5
Letters of Map Change

23
Flood-related countywide presidential disaster declarations

1
Paid claims outside of the effective flood high hazard area²

\$0
Repetitive Loss (RL) paid losses²

0
RL properties²

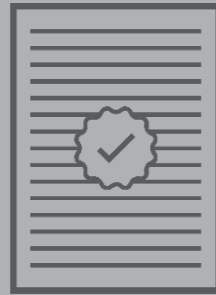
19%
of households spend 30% or more of their income on housing

4%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Sutton/Braxton, WV



Your Hazard Mitigation Plan has been approved through **July 4, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Participate in acquisition and demolition, relocation, mitigation reconstruction and elevation.
- Make necessary improvements to the town's storm sewer collection system along North Hill Road. Continue to make permitting necessary before any new construction is allowed. Permitting should be made to work with any/all floodplain ordinances.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Small Town



05/15/1991
Date of Last CAV⁴

12/04/2018
Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$7K

Category A: Debris
Removal

\$52K

Category B: Protective
Measures

\$214K

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

1

Hazard Mitigation Grant
Program

0

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

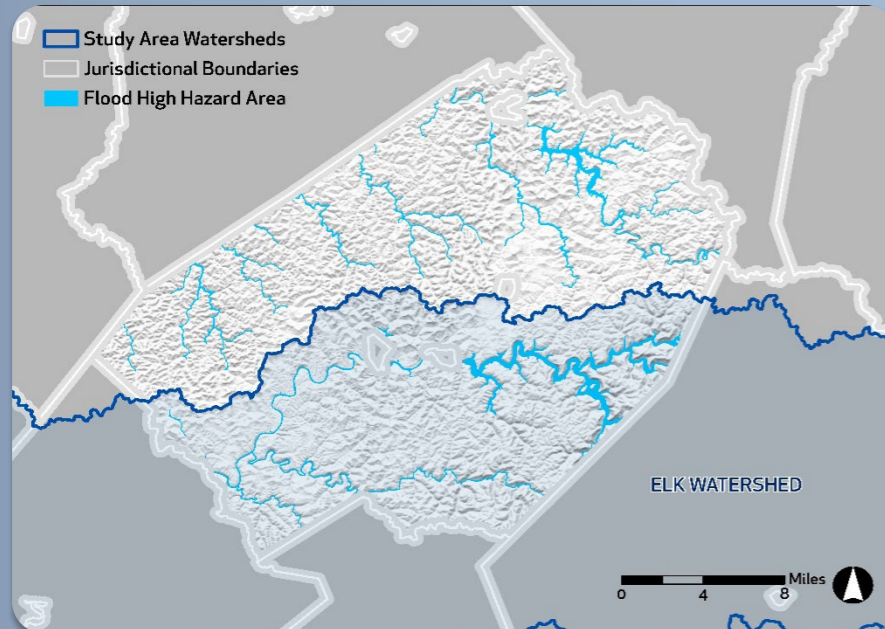
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)



Braxton County (Unincorporated Areas)/ Braxton County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)



04/19/2010
Initial FIRM¹ date

04/19/2010
Effective FIRM date

\$439K
Total paid losses²

34
Total paid claims²

56
Flood insurance policies in force

34
Policies in the effective flood high hazard area

8,550
Estimated structures in the community

955
Estimated structures in the flood high hazard area

36
Letters of Map Change

23
Flood-related countywide presidential disaster declarations

10
Paid claims outside of the effective flood high hazard area²

\$101K
Repetitive Loss (RL) paid losses²

5
RL properties²

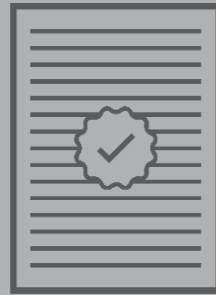
18%
of households spend 30% or more of their income on housing

10%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Braxton County (Unincorporated Areas)/Braxton, WV



Your Hazard Mitigation Plan has been approved through **July 4, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Participate in acquisition and demolition, relocation, mitigation reconstruction and elevation.
- Continue to make informational pamphlets available to Braxton County residents that promote buying flood insurance.
- Continue to make permitting necessary before any new construction is allowed. Permitting should be made to work with any/all floodplain ordinances.
- Provide opportunities for leaders in Braxton County to participate in FEMA and other agency programs.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf


Land Use Trend:
Rural


05/15/1991
Date of Last CAV⁴
12/06/2018
Date of Last CAC⁴


PARTICIPATING
in the National Flood
Insurance Program
NOT PARTICIPATING
in the Community
Rating System


Countywide Public
Assistance received
\$7K
Category A: Debris
Removal

\$52K
Category B: Protective
Measures
\$214K
Categories C-G: Permanent
Work


Hazard Mitigation
Assistance Projects
Countywide
1
Hazard Mitigation Grant
Program
0
Pre-Disaster
Mitigation
0
Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

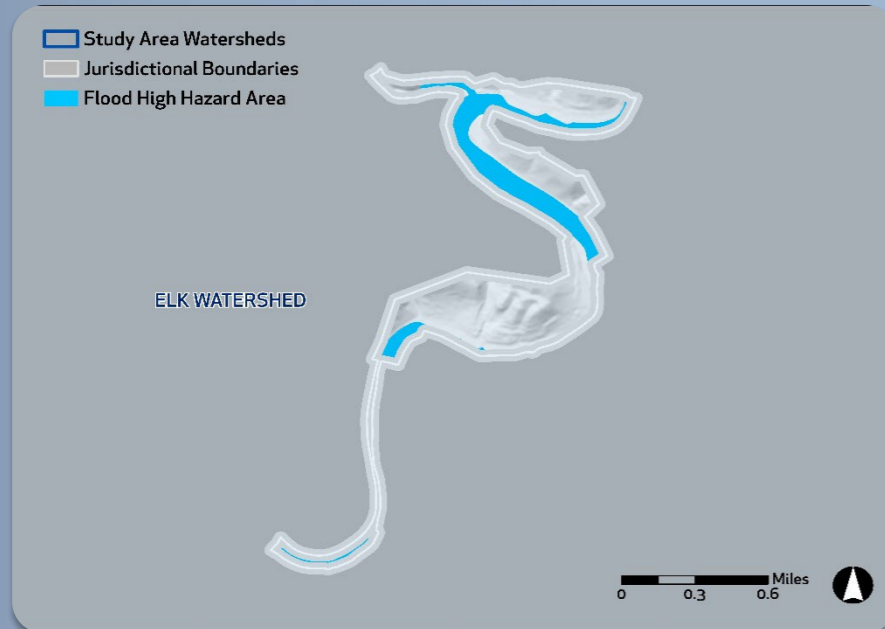
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Clay/Clay County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



03/18/1991
Initial FIRM¹ date

02/06/2013
Effective FIRM date

\$178K
Total paid losses²

11
Total paid claims²

9
Flood insurance policies in force

6
Policies in the effective flood high hazard area

300
Estimated structures in the community

60
Estimated structures in the flood high hazard area

1
Letters of Map Change

24
Flood-related countywide presidential disaster declarations

4
Paid claims outside of the effective flood high hazard area²

\$0
Repetitive Loss (RL) paid losses²

0
RL properties²

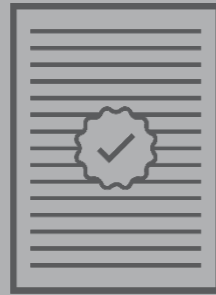
56%
of households spend 30% or more of their income on housing

16%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Clay/Clay, WV



Your Hazard Mitigation Plan expired on **May 22, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Elevate vital equipment for wastewater treatment to ensure continuous operation.
- Continue to participate in the National Flood Insurance Program (NFIP).
- Work with the county to update all floodplain ordinances adopted prior to 1987.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Small Town



04/30/1992
Date of Last CAV⁴

10/24/2018
Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$1.7M

Category A: Debris
Removal

\$468K

Category B: Protective
Measures

\$11.4M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

0

Hazard Mitigation Grant
Program

0

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

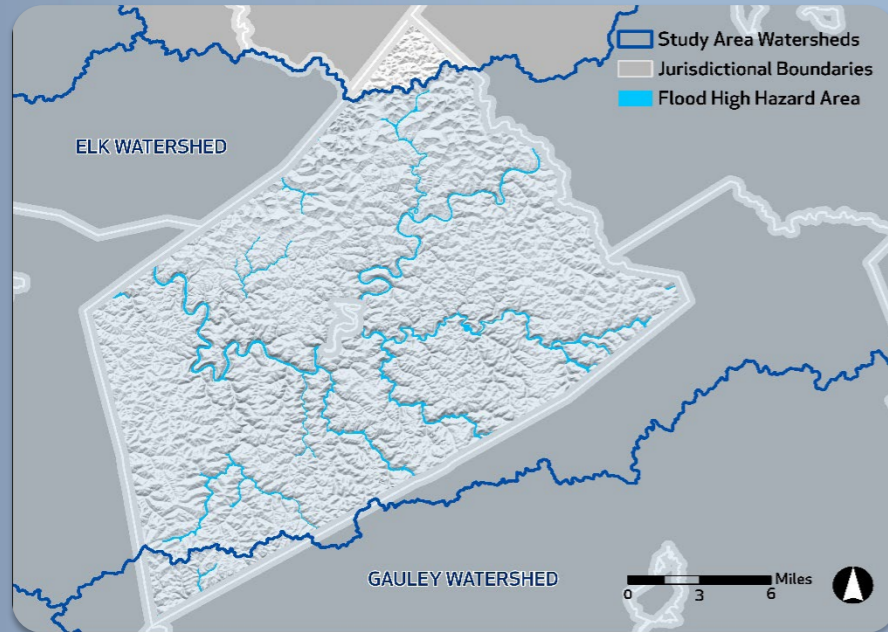
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Clay County (Unincorporated Areas)/Clay County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



03/18/1991
Initial FIRM¹ date

02/06/2013
Effective FIRM date

\$1.5M
Total paid losses²

60
Total paid claims²

78
Flood insurance policies in force

47
Policies in the effective flood high hazard area

4260
Estimated structures in the community

740
Estimated structures in the flood high hazard area

48
Letters of Map Change

24
Flood-related countywide presidential disaster declarations

25
Paid claims outside of the effective flood high hazard area²

\$301K
Repetitive Loss (RL) paid losses²

5
RL properties²

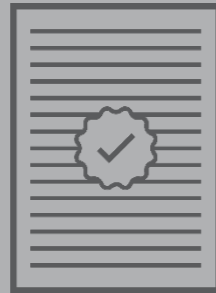
18%
of households spend 30% or more of their income on housing

17%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Clay County (Unincorporated Areas)/Clay, WV



Your Hazard Mitigation Plan expired on **May 22, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Create a GIS data layer of flood maps on county mapping database to identify floodplain areas of Clay County.
- Institute a countywide permitting process that will require residents and/or developers to file a permit with the county before beginning any new construction as a means of regulating floodplain development.
- Educate citizens to clear trash, vegetation, and tree stumps from nearby creeks that impede water flow.
- Review existing regulations to ensure adequacy in reducing the amount of future development in identified hazard areas.
- Provide additional training to county and municipal development officials on NFIP requirements.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf


Land Use Trend:
Rural


05/14/2018
 Date of Last CAV⁴
08/01/2018
 Date of Last CAC⁴


PARTICIPATING
 in the National Flood
 Insurance Program
NOT PARTICIPATING
 in the Community
 Rating System


 Countywide Public
 Assistance received
\$1.7M
 Category A: Debris
 Removal

\$468K
 Category B: Protective
 Measures
\$11.4M
 Categories C-G: Permanent
 Work


 Hazard Mitigation
 Assistance Projects
 Countywide
0
 Hazard Mitigation Grant
 Program
0
 Pre-Disaster
 Mitigation
0
 Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

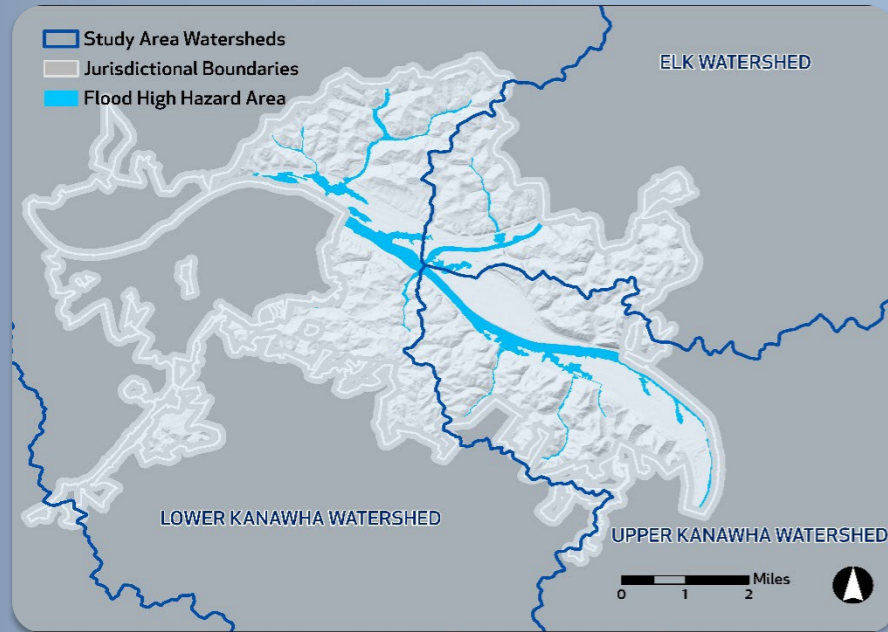
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

City of Charleston/Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)




06/15/1983
Initial FIRM¹ date

02/06/2008
Effective FIRM date




\$1.8M
Total paid losses²

355
Total paid claims²



237
Flood insurance policies in force

147
Policies in the effective flood high hazard area



21,255
Estimated structures in the community

1,770
Estimated structures in the flood high hazard area




104
Letters of Map Change



29
Flood-related countywide presidential disaster declarations



59
Paid claims outside of the effective flood high hazard area²




\$891K
Repetitive Loss (RL) paid losses²

58
RL properties²



30%
of households spend 30% or more of their income on housing

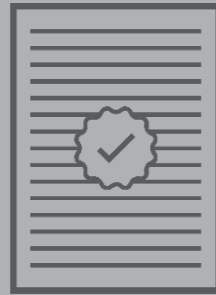


8%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



City of Charleston/Kanawha, WV



Your Hazard Mitigation Plan expired on **May 22, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Distribute information to all property owners in repetitive loss areas within the city of Charleston regarding potential flood hazards as required for participation in the Community Rating System.
- Continue to hold local courses on the National Flood Insurance Program (NFIP) for land-use organizations (e.g., realtors, bankers, construction companies, surveyors, and insurers).
- Implement a Geographic Information System with an emphasis on hazard analysis.
- Continue participating in the Community Rating System (CRS).
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Identify property owners of RL and non-RL properties that may be willing to participate in future property acquisition and demolition projects.
- Add floodplain information to the Charleston Planning website.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Urban



10/21/2010
Date of Last CAV⁴

07/24/2017
Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$3.6M

Category A: Debris
Removal

\$23.4M

Category B: Protective
Measures

\$13.2M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

53

Hazard Mitigation Grant
Program

1

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

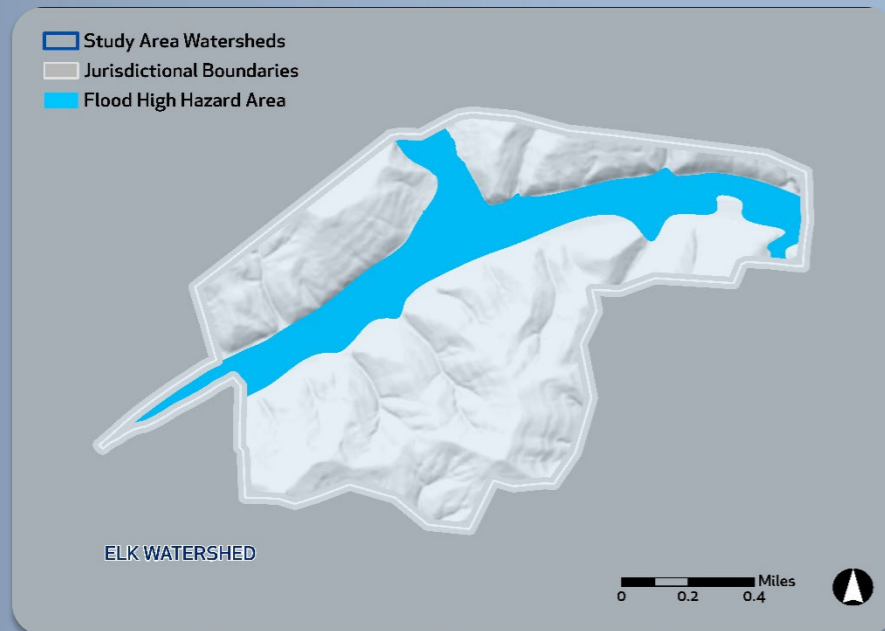
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Clendenin/Kanawha County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



07/16/1984
Initial FIRM¹ date

02/06/2008
Effective FIRM date

\$6.6M
Total paid losses²

122
Total paid claims²

46
Flood insurance policies in force

40
Policies in the effective flood high hazard area

540
Estimated structures in the community

325
Estimated structures in the flood high hazard area

2
Letters of Map Change

29
Flood-related countywide presidential disaster declarations

7
Paid claims outside of the effective flood high hazard area²

\$913K
Repetitive Loss (RL) paid losses²

14
RL properties²

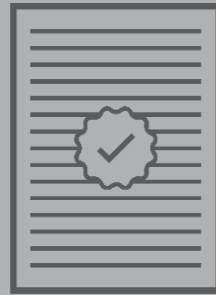
28%
of households spend 30% or more of their income on housing

51%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Clendenin/Kanawha, WV



Your Hazard Mitigation Plan expired on **May 22, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to buy back repetitive loss properties.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Continue to participate in the National Flood Insurance Program (NFIP).
- Continue to enforce current floodplain regulations

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Small Town



12/02/2015
Date of Last CAV⁴

10/09/2018
Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$3.6M

Category A: Debris
Removal

\$23.4M

Category B: Protective
Measures

\$13.2M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

53

Hazard Mitigation Grant
Program

1

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

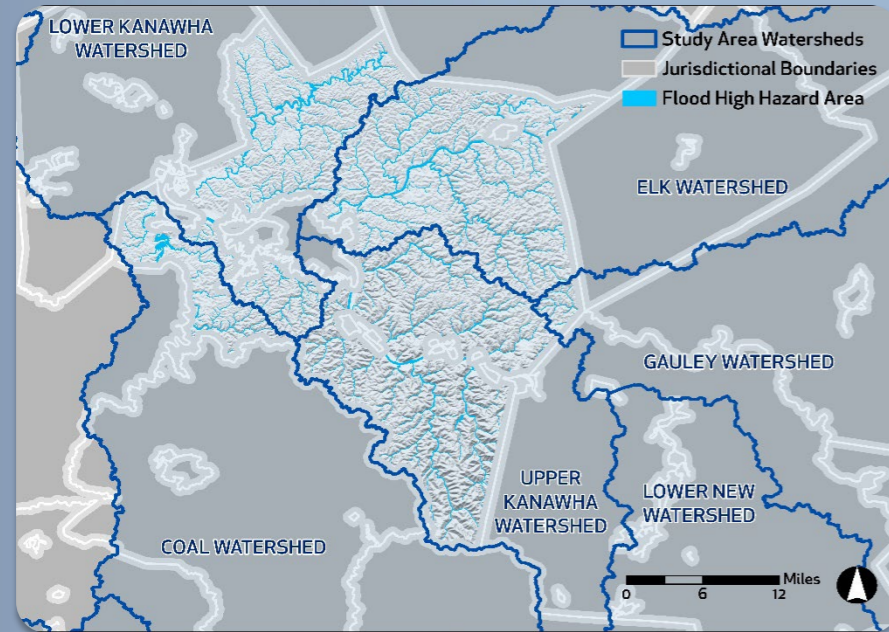
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Kanawha County (Unincorporated Areas)/

Kanawha County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)




03/18/1985
Initial FIRM¹ date

02/06/2008
Effective FIRM date



\$28.8M
Total paid losses²

1587
Total paid claims²



1099
Flood insurance policies in force

832
Policies in the effective flood high hazard area



48530
Estimated structures in the community

10135
Estimated structures in the flood high hazard area



308
Letters of Map Change



29
Flood-related countywide presidential disaster declarations



348
Paid claims outside of the effective flood high hazard area²




\$11.5M
Repetitive Loss (RL) paid losses²

296
RL properties²



18%
of households spend 30% or more of their income on housing

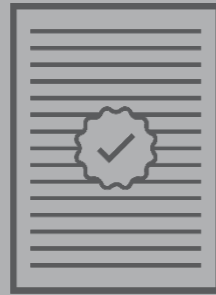


20%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Kanawha County (Unincorporated Areas)/Kanawha, WV



Your Hazard Mitigation Plan expired on **May 22, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to hold courses on the National Flood Insurance Program for realtors, banks, and insurers.
- Work with municipalities to update all floodplain ordinances adopted prior to 1987.
- Provide additional training to county and municipal personnel responsible for the enforcement of the floodplain regulations.
- Explore participation in the Community Rating System (CRS).
- Maintain a database of information on all repetitive loss properties including maps.
- As funding is available, consider traditional flood mitigation projects such as acquisition and demolition, elevation, relocation, and mitigation reconstruction.
- Work with WV Department of Transportation to identify areas of frequent roadway flooding and develop mitigation strategies.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Rural



08/18/2014

Date of Last CAV⁴

01/25/2018

Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$3.6M

Category A: Debris
Removal

\$23.4M

Category B: Protective
Measures

\$13.2M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

53

Hazard Mitigation Grant
Program

1

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

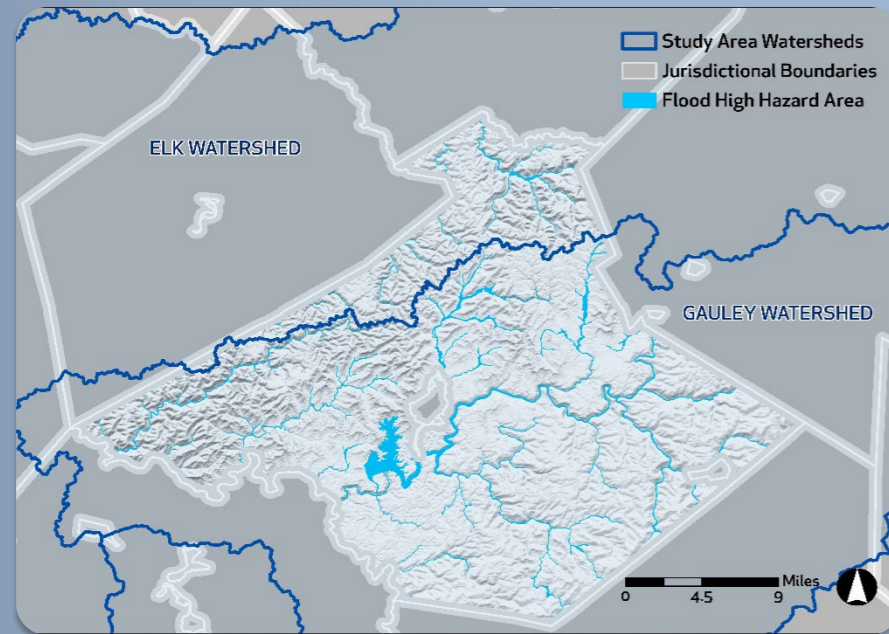
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Nicholas County (Unincorporated Areas)/

Nicholas County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)




11/06/1991
Initial FIRM¹ date

09/24/2021
Effective FIRM date




\$2.0M
Total paid losses²

67
Total paid claims²




51
Flood insurance policies in force

34
Policies in the effective flood high hazard area



13,720
Estimated structures in the community

800
Estimated structures in the flood high hazard area



23
Letters of Map Change



24
Flood-related countywide presidential disaster declarations



19
Paid claims outside of the effective flood high hazard area²




\$70K
Repetitive Loss (RL) paid losses²

2
RL properties²

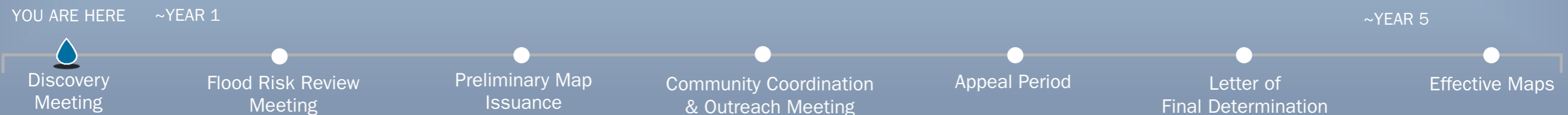


17%
of households spend 30% or more of their income on housing

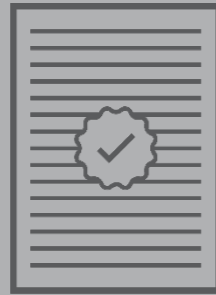


6%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Nicholas County (Unincorporated Areas)/Nicholas, WV



Your Hazard Mitigation Plan expired on **February 21, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Continue to review and update floodplain ordinances to regulate development within the 100-year flood plain. Make sure the public is aware of requirements in the ordinances.
- Continue to train and recertify the county Floodplain Coordinator to assist citizens in complying with the floodplain ordinances.
- Continue to update the GIS data layer of flood maps on the county mapping database to identify floodplain areas of Nicholas County.
- Continue working with municipalities to update floodplain ordinances adopted prior to 1987.
- Continue training the county and municipal development officials on NFIP requirements.
- As funds become available, undertake buyout and/or elevation projects to lessen the number of repetitive loss properties.

Continue to review all capital improvement plans to ensure that infrastructure improvements are not directed towards hazardous areas. If they are, build mitigation measures into development plans.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf


Land Use Trend:
Rural


05/03/2013
 Date of Last CAV⁴
07/05/2017
 Date of Last CAC⁴


PARTICIPATING
 in the National Flood
 Insurance Program
NOT PARTICIPATING
 in the Community
 Rating System


 Countywide Public
 Assistance received
\$920K
 Category A: Debris
 Removal

\$22.1M
 Category B: Protective
 Measures

\$4.9M
 Categories C-G: Permanent
 Work


 Hazard Mitigation
 Assistance Projects
 Countywide
9
 Hazard Mitigation Grant
 Program
0
 Pre-Disaster
 Mitigation
0
 Flood Mitigation Assistance

NEXT STEPS:

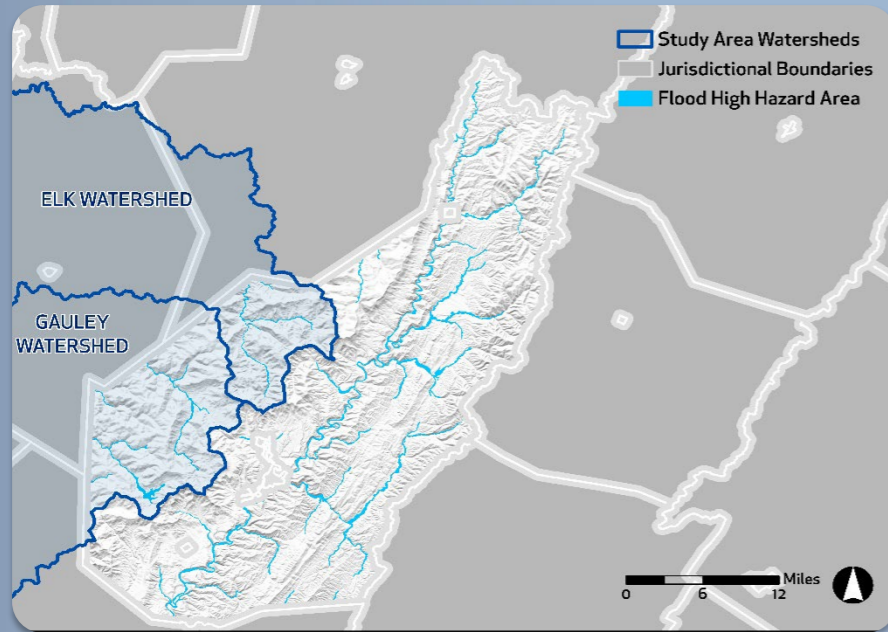
1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Pocahontas County (Unincorporated Areas)/ Pocahontas County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)



10/17/1989
Initial FIRM¹ date

11/04/2010
Effective FIRM date

\$2.2M
Total paid losses²

155
Total paid claims²

111
Flood insurance policies in force

65
Policies in the effective flood high hazard area

8,480
Estimated structures in the community

530
Estimated structures in the flood high hazard area

10
Letters of Map Change

22
Flood-related countywide presidential disaster declarations

9
Paid claims outside of the effective flood high hazard area²

\$498K
Repetitive Loss (RL) paid losses²

13
RL properties²

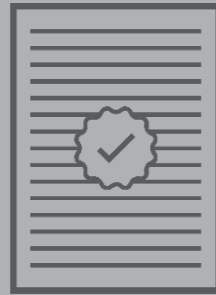
19%
of households spend 30% or more of their income on housing

5%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Pocahontas County (Unincorporated Areas)/Pocahontas, WV



Your Hazard Mitigation Plan expired on **February 21, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Review and update floodplain ordinances to ensure full compliance with National Flood Insurance Program (NFIP) standards.
- Educate local government representatives about the NFIP and its requirements. This project may include the facilitation of public forums to encourage questions regarding the NFIP.
- Coordinate with appropriate agencies to obtain updated NFIP policy-holder information within Pocahontas County.
- Coordinate with FEMA to maintain an updated list of repetitive loss properties throughout Pocahontas County and the municipalities therein.
- Input repetitive loss properties into a GIS database for use in future mitigation activities.
- As funds become available, undertake buyout and/or elevation projects to lessen the number of repetitive loss properties. This project also includes non-RL properties. As part of this process, hold a series of public meetings with property owners to identify specific project areas and to gauge interest in project participation.
- Coordinate with WVDOH to repair or install culverts in an effort to alleviate backup onto roads during high volume rain incidents.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf


Land Use Trend:
Rural


N/A
 Date of Last CAV⁴
06/28/2021
 Date of Last CAC⁴


PARTICIPATING
 in the National Flood
 Insurance Program
NOT PARTICIPATING
 in the Community
 Rating System


 Countywide Public
 Assistance received
\$0
 Category A: Debris
 Removal

\$137K
 Category B: Protective
 Measures
\$27K
 Categories C-G: Permanent
 Work


 Hazard Mitigation
 Assistance Projects
 Countywide
2
 Hazard Mitigation Grant
 Program
0
 Pre-Disaster
 Mitigation
0
 Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

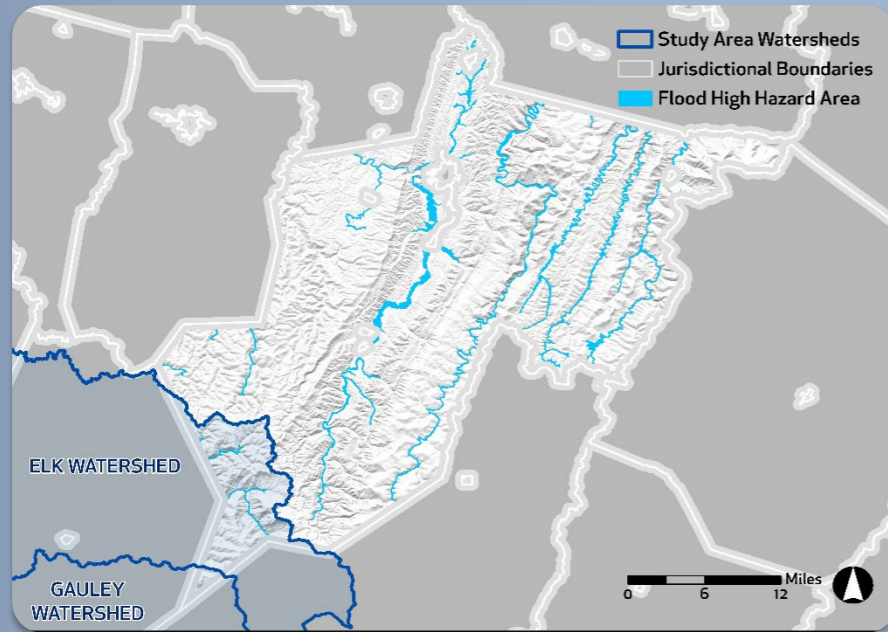

¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Randolph County Unincorporated Areas)

Randolph County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)

09/27/1991
Initial FIRM¹ date

09/29/2010
Effective FIRM date




\$2.9M
Total paid losses²

302
Total paid claims²




123
Flood insurance policies in force

85
Policies in the effective flood high hazard area



13,105
Estimated structures in the community

1,595
Estimated structures in the flood high hazard area



98
Letters of Map Change



21
Flood-related countywide presidential disaster declarations



33
Paid claims outside of the effective flood high hazard area²




\$1.5M
Repetitive Loss (RL) paid losses²

43
RL properties²



19%
of households spend 30% or more of their income on housing

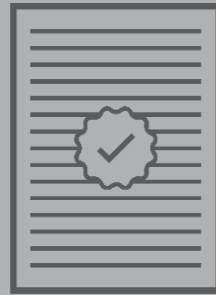


10%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Randolph County Unincorporated Areas)/Randolph, WV



Your Hazard Mitigation Plan has been approved through **July 4, 2023**, and now is the time to review it. Some projects you identified to reduce flood risk include the following:

- Participate in acquisition and demolition, relocation, mitigation reconstruction and elevation.
- Preserve open space areas as a means of eliminating structures that could sustain flood damage.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Rural



09/19/2014

Date of Last CAV⁴

10/04/2021

Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$92K

Category A: Debris
Removal

\$327K

Category B: Protective
Measures

\$1.9M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

7

Hazard Mitigation Grant
Program

0

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

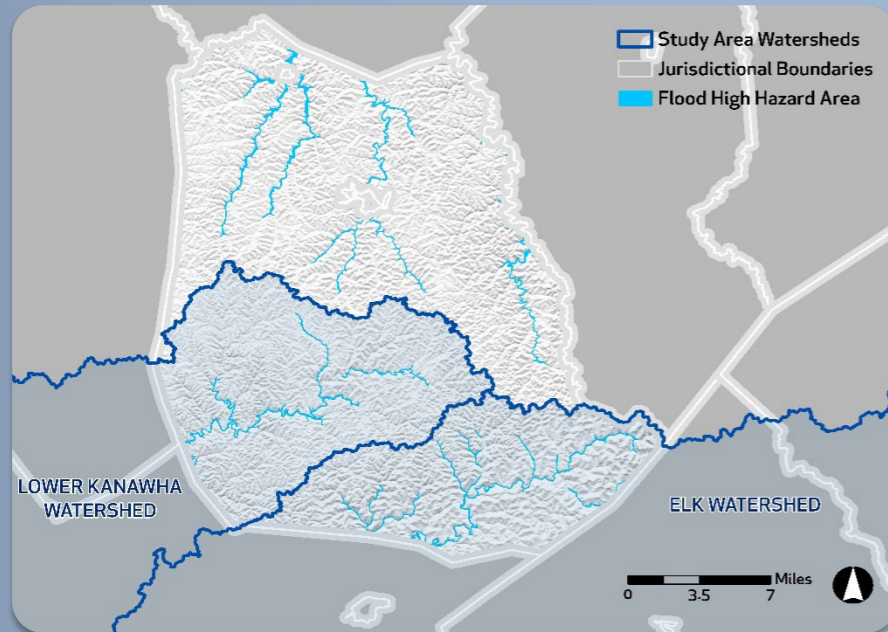
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Roane County (Unincorporated Areas)/Roane County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



09/10/1984
Initial FIRM¹ date

03/02/2012
Effective FIRM date

\$2.2M
Total paid losses²

83
Total paid claims²

83
Flood insurance policies in force

40
Policies in the effective flood high hazard area

9,095
Estimated structures in the community

910
Estimated structures in the flood high hazard area

73
Letters of Map Change

23
Flood-related countywide presidential disaster declarations

46
Paid claims outside of the effective flood high hazard area²

\$620K
Repetitive Loss (RL) paid losses²

11
RL properties²

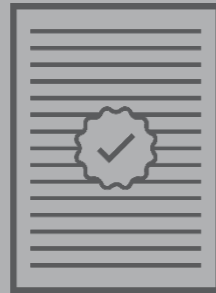
19%
of households spend 30% or more of their income on housing

9%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Roane County (Unincorporated Areas)/Roane, WV



Your Hazard Mitigation Plan expired on **December 4, 2021**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Roane County will continue to seek out opportunities to apply for Hazard Mitigation Assistance (HMA) funds for mitigation reconstruction, elevations, relocations, or acquisitions or identified at risk, repetitive loss, non-repetitive loss, substantial damaged, partially or completely demolished or destroyed properties within the County. If mitigation reconstruction is chosen, properties identified as partially or completely demolished, outside of the regulatory floodway, as identified by available flood hazard data, will be reconstructed in accordance with the standards established in the local floodplain ordinance and in accordance with the same conditions as an elevated structure. The County will comply with all acquisition, elevation, relocation, and mitigation reconstruction requirements, as per the HMA Guidance.
- The Roane County 911/OES and EMS Centers are currently located in a floodplain and were flooded to the point of evacuation 2012. The Center needs to be relocated to a more secure location.
- Evaluate and formulate action plan to conduct flood mitigating buyouts for repeatedly flooded single family properties located in Spencer along Bens Run.
- Relocate the Reedy VFD as it is susceptible to flooding.
- Explore and conduct flood mitigation buyouts in the greater Roane County along Spring Creek, Pidgeon Run, Little Pidgeon Run, Big Sandy Creek, and Hurricane Creek
- Establish position in Roane County to enforce permit requirements for mobile homes to ensure that they are not established in flood plains and are installed or anchored correctly to prevent damage during wind events.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

N/A
 Date of Last CAV⁴

08/22/2017
 Date of Last CAC⁴

PARTICIPATING
 in the National Flood Insurance Program

NOT PARTICIPATING
 in the Community Rating System

Countywide Public Assistance received

\$303K
 Category A: Debris Removal

\$185K
 Category B: Protective Measures

\$1.9M
 Categories C-G: Permanent Work

Hazard Mitigation Assistance Projects Countywide

0
 Hazard Mitigation Grant Program

0
 Pre-Disaster Mitigation

0
 Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

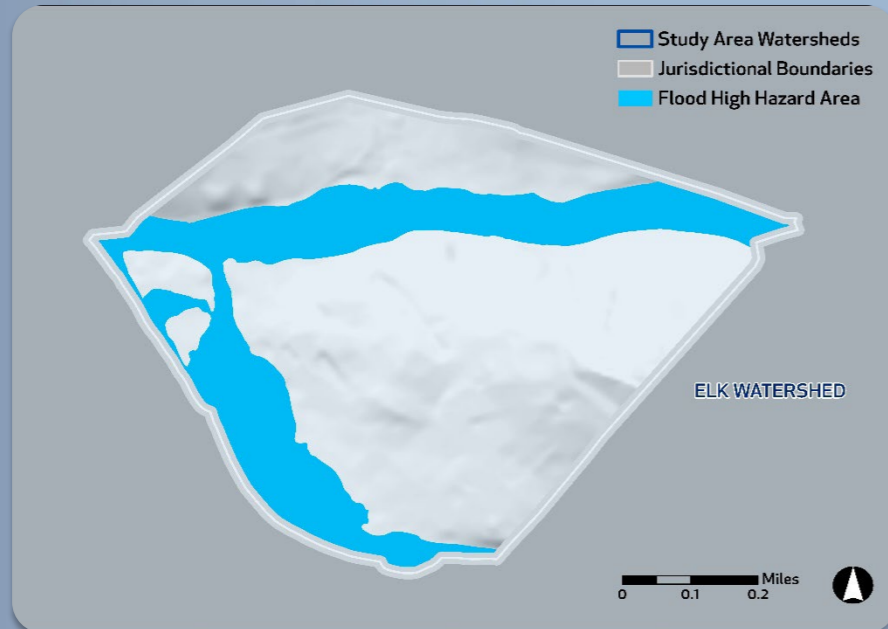
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Town of Addison (Webster Springs)/Webster County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



02/16/1990
Initial FIRM¹ date

01/06/2012
Effective FIRM date

\$162K
Total paid losses²

41
Total paid claims²

17
Flood insurance policies in force

12
Policies in the effective flood high hazard area

420
Estimated structures in the community

145
Estimated structures in the flood high hazard area

1
Letters of Map Change

22
Flood-related countywide presidential disaster declarations

5
Paid claims outside of the effective flood high hazard area²

\$0
Repetitive Loss (RL) paid losses²

0
RL properties²

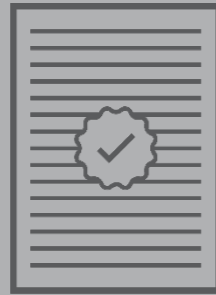
33%
of households spend 30% or more of their income on housing

31%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Town of Addison (Webster Springs)/Webster, WV



Your Hazard Mitigation Plan expired on **February 21, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Clean waterways to prevent water from backing up and possibly flooding certain areas.
- Institute stricter floodplain enforcement.
- Identify all Repetitive Loss (RL) and flood prone non-RL properties within the county and coordinate with owners who would like to participate in future elevation, buyout, and retrofitting projects.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf



Land Use Trend:
Small Town



N/A

Date of Last CAV⁴

12/04/2018

Date of Last CAC⁴



PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System



Countywide Public
Assistance received

\$1.5M

Category A: Debris
Removal

\$287K

Category B: Protective
Measures

\$1.9M

Categories C-G: Permanent
Work



Hazard Mitigation
Assistance Projects
Countywide

1

Hazard Mitigation Grant
Program

0

Pre-Disaster
Mitigation

0

Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

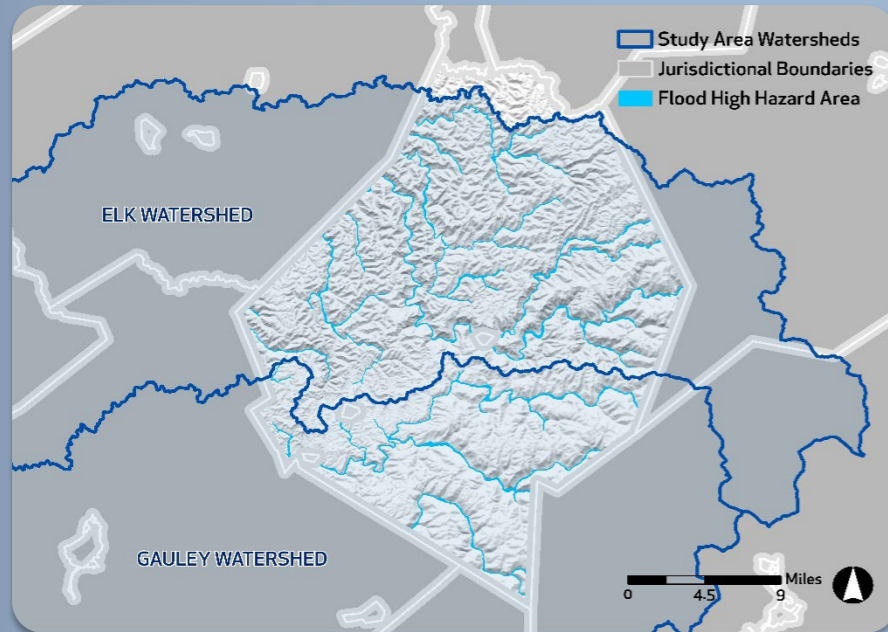
¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

Webster County (Unincorporated Areas)/

Webster County, WV **KNOW YOUR RISK** (The information presented below are estimates as of August 2022.)



02/16/1990
Initial FIRM¹ date

01/06/2012
Effective FIRM date

\$1.9M
Total paid losses²

140
Total paid claims²

69
Flood insurance policies in force

45
Policies in the effective flood high hazard area

4,950
Estimated structures in the community

1,000
Estimated structures in the flood high hazard area

6
Letters of Map Change

22
Flood-related countywide presidential disaster declarations

46
Paid claims outside of the effective flood high hazard area²

\$418K
Repetitive Loss (RL) paid losses²

13
RL properties²

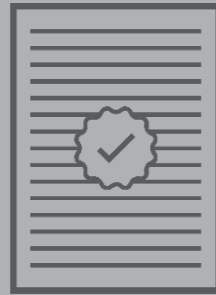
18%
of households spend 30% or more of their income on housing

17%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline



Webster County (Unincorporated Areas)/Webster, WV



Your Hazard Mitigation Plan expired on **February 21, 2022**, and now is the time to update it. Some projects you identified to reduce flood risk in this previous plan include the following:

- Institute stricter floodplain enforcement.
- Identify all Repetitive Loss (RL) and flood prone non-RL properties within the county and coordinate with owners who would like to participate in future elevation, buyout, and retrofitting projects.
- Clean waterways to prevent water from backing up and possibly flooding certain areas.
- Undertake Source Water Protection Planning measures following state guidelines.

Find ideas to mitigate flood risk on [fema.gov](https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf):
https://www.fema.gov/sites/default/files/2020-06/fema-mitigation-ideas_02-13-2013.pdf

Land Use Trend:
Rural

12/04/2018
Date of Last CAV⁴

06/08/2017
Date of Last CAC⁴

PARTICIPATING
in the National Flood
Insurance Program

NOT PARTICIPATING
in the Community
Rating System

Countywide Public
Assistance received

\$1.5M
Category A: Debris
Removal

\$287K
Category B: Protective
Measures

\$1.9M
Categories C-G: Permanent
Work

Hazard Mitigation
Assistance Projects
Countywide

1
Hazard Mitigation Grant
Program

0
Pre-Disaster
Mitigation

0
Flood Mitigation Assistance

NEXT STEPS:

1. Communities should review their Floodplain Management Ordinance and Building Code to ensure alignment with flood risks discussed and identified during Discovery.
2. Stay in contact with FEMA for community mapping and Public Assistance needs.
3. **Long-term Horizon: Possible Flood Risk Review Meeting**

¹ Flood Insurance Rate Map (FIRM)

² Since 1978

³ Community Assistance Visit (CAV) / Community Assistance Contact (CAC)

APPENDIX B | ACRONYMS AND ABBREVIATIONS

ACRONYM	DEFINITION
CAC	Community Assistance Contact
CAV	Community Assistance Visit
CCO	Consultation Coordination Officer
CHHA	Coastal High Hazard Area
CIS	Community Information System
CNMS	Coordinated Needs Management Strategy
CRS	Community Rating System
DR	Presidential Major Disaster Declaration
EM	Presidential Emergency Declaration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
IHP	Individual and Households Program
LiDAR	Light Detection and Ranging
LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR	Letter of Map Revision
MIP	Mapping Information Platform
MLI	Mid-Term Levee Inventory
MSC	Map Service Center
NFHL	National Flood Hazard Layer
NFIP	National Flood Insurance Program
NRCS	Natural Resources Conservation Service
PDM	Pre-Disaster Mitigation
Risk MAP	Risk Mapping, Assessment, and Planning
SFHA	Special Flood Hazard Area
STN	Short-Term Network
TEIF	Total Exposure in Floodplain
TGA	Targeted Growth Area
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VDEM	Virginia Department of Emergency Management
WSEL	Water-Surface Elevation

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APPENDIX D | GLOSSARY

0.2-Percent-Annual-Chance Flood – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

1-Percent-Annual-Chance Flood – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

Approximate Stream Miles – Refers to areas mapped with approximate study methods. Approximate study methods show the approximate outline of the base floodplain, but generally do not produce a base flood elevation. These studies are performed in areas with little or no development or expectation of development.

Base Flood Elevation (BFE) – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

Cfs – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

Community Assistance Contact (CAC) – The CAC is a telephone call or brief visit to an NFIP community for the purpose of establishing or re-establishing contact to determine if any program-related problems exist and to offer assistance.

Community Assistance Visit (CAV) – A CAV is a scheduled visit to an NFIP community for the purpose of conducting a comprehensive assessment of the community's floodplain management program. A CAV typically involves a tour of the floodplain, a meeting with local floodplain management officials, a review of the community's floodplain management ordinances, an examination of the community's floodplain development permit and variance files, and a meeting with the community to discuss any identified deficiencies, offer technical assistance, help address any deficiencies, and identify good floodplain management practices.

Comprehensive Plans – Local comprehensive plans, also referred to as master plans or general plans, provide a framework for the physical design and development of a community over a long-term planning horizon.

Critical Facilities – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. Critical facilities may include hospitals, emergency operations centers, police stations, fire stations, and schools.

Dam – An artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water.

Detailed Stream Miles – Refers to areas mapped with detailed study methods. Detailed studies use hydrologic and hydraulic methods that produce BFEs, floodways, and other pertinent flood data. These studies are performed in developed areas and in areas experiencing rapid growth.

Flood – A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters or (2) the unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community.

APPENDIX D | GLOSSARY

Flood Insurance Study (FIS) Report – Contains an examination, evaluation, and determination of the flood hazards of a community and, if appropriate, the corresponding water-surface elevations.

Flood Risk – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. This is sometimes referred to as flood vulnerability.

Floodplain – The land adjoining the channel of a river, stream, ocean, lake, or other watercourse or water body that is susceptible to flooding.

Floodplain Boundary Tie-Ins – Refers to the contiguity of floodplain boundaries along the edges of the Risk MAP project study area. Areas where a significant mismatch, gap, or overlap is identified must be addressed to create a seamless transition.

Freeboard – A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. “Freeboard” tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Hazard Mitigation Plan (HMP) – A community’s HMP documents the findings of its risk assessment and the long-term strategies it will pursue to reduce the effects of disasters on people, property, and the environment.

HEC-RAS – A computer modeling software used to conduct a hydraulic study, which produces flood elevations, velocities, and floodplain widths.

Letter of Map Amendment (LOMA) – One type of LOMC. Typically, a LOMA is issued when the scale of the FIRM does not allow for small areas of natural high ground to be shown outside the SFHA.

Letter of Map Change (LOMC) – A letter that reflects an official revision and/or an amendment to an effective FIRM, which has various uses. If a property owner thinks their property has been inadvertently mapped in an SFHA, property owners or their representatives may submit a request to FEMA for a LOMC. In another use, FEMA issues LOMCs in place of physically revising an effective FIRM.

Letter of Map Revision (LOMR) – One type of LOMC. LOMRs are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective BFEs, or the SFHA. The LOMR officially revises the FIRM.

Levee – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to reduce risk from temporary flooding.

Light Detection and Ranging (LiDAR) – A remote sensing technology that produces highly accurate and dense elevation data. FEMA uses LiDAR data to create digital elevation models for hydraulic modeling of floodplains, digital terrain maps, and other NFIP products.

National Flood Insurance Program (NFIP) – The program of flood insurance coverage and floodplain management administered under the National Flood Insurance Act of 1968 and any amendments to it, and

APPENDIX D | GLOSSARY

applicable Federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B.

Orthophotography – Orthophotography data typically are high-resolution aerial images that combine the visual attributes of an aerial photograph with the spatial accuracy and reliability of a planimetric map.

Redelineated Stream Miles – Refers to areas that are remapped using more detailed topographic data than that used to prepare the effective FIRM. Redelineation is a useful technique for updating flood hazard information when effective discharges and BFEs appear accurate, but the SFHA seems inaccurate.

Repetitive Loss (RL) Building – Any insurable building for which two or more claims of more than \$1,000 were paid by the NFIP within any rolling 10-year period, since 1978. An RL property may or may not be currently insured by the NFIP.

Risk Mapping, Assessment, and Planning (Risk MAP) – A FEMA strategy to work collaboratively with State, local, and Tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

Riverine – Of, or produced by, a river. Riverine floodplains have readily identifiable channels.

Special Flood Hazard Area (SFHA) – Portion of the floodplain subject to inundation by the 1-percent-annual-chance or base flood.

Stafford Act – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and FEMA programs.

Substantial Damage – Damage of any origin sustained by a structure whereby the cost of restoring the structure to its pre-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

Total Exposure in Floodplain (TEIF) – An analysis of the total potential economic losses (exposure) in the SFHA.

Watershed – An area that drains into a lake, stream, or other body of water.

Zone A – Areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no BFEs or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Zone AE – Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. BFEs are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

Zone AO – Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements

APPENDIX D | GLOSSARY

and floodplain management standards apply. Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes. Communities are encouraged to adopt more restrictive requirements for these areas.

Zone AH – Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. BFEs derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply.

APPENDIX E | ADDITIONAL DATA

a. Data Collection for the Elk Watershed

Data Types	Deliverable/Product	Source
Average Annual Loss	Discovery Map Geodatabase	FEMA's Hazus Average Annualized Loss Viewer
Boundaries: Community	Discovery Map Geodatabase	Flood Insurance Rate Map (FIRM) Databases
Boundaries: County and State	Discovery Map Geodatabase	U.S. Census
Boundaries: Watershed	Discovery Map Geodatabase	U.S. Geological Survey (USGS)
Census Blocks	Discovery Map Geodatabase	U.S. Census
Comprehensive Plan Summary	Discovery Report, Community Dashboards	City, County, and Town Planning Commissions
CRS Participation	Discovery Report, Community Dashboards	FEMA Community Information System (CIS)
Dams	Discovery Map Geodatabase, Discovery Report, Community Dashboard	U.S. Army Corps of Engineers (USACE) National Dam Inventory
Declared Disasters	Discovery Report, Community Dashboards	Disaster Declaration Database
Effective Floodplains: Special Flood Hazard Areas (SFHAs)	Discovery Map Geodatabase	FEMA's National Flood Hazard Layer (NFHL) from the Flood Map Service Center (MSC)
Hazard Mitigation Assistance Grants	Discovery Report, Community Dashboards	FEMA Region III's Database
Identified Mitigation Actions	Discovery Map Geodatabase, Discovery Report, Community Dashboard	Planning District Commission Hazard Mitigation Plans
Individual Assistance	Discovery Report	FEMA Individuals and Households Program Database
Letters of Map Change	Discovery Map Geodatabase, Discovery Report, Community Dashboard	FEMA's Mapping Information Platform (MIP)
Levee Inventory	Discovery Map Geodatabase, Discovery Report, Community Dashboard	FEMA's National Levee Inventory Map
Mitigation Plan Status and Summary	Discovery Report, Community Dashboard	Planning District Commissions
National Hydrography Stream Data	Discovery Map Geodatabase	FEMA's NFHL
NFIP Participation	Discovery Report, Community Dashboard	CIS
Population and Socioeconomic Characteristics	Discovery Report, Community Dashboard	U.S. Census Bureau
Public Assistance	Discovery Report	FEMA Public Assistance Database
Stream Gages	Discovery Map Geodatabase, Discovery Report, Community Dashboard	USGS
Structures	Discovery Map Geodatabase, Community Dashboard	FEMA's NFHL
Study Needs: FEMA	Discovery Map Geodatabase, Discovery Report	CNMS
Topography	Discovery Map Geodatabase	See Table b.
Total Exposure in Floodplain (TEIF)	Discovery Map Geodatabase, Discovery Report	Region III TEIF Database
Transportation: Roads and Railroads	Discovery Map Geodatabase	U.S. Census

APPENDIX E | ADDITIONAL DATA

b. List of Topographic Data Sources by County

County or City	Source	Date	Website
Braxton County	2018 FEMA Region III SouthCentral (Central Lot) QL2 LiDAR	2018	Pending
Clay County	2018 FEMA Region III SouthCentral (Central Lot) QL2 LiDAR	2018	Pending
Kanawha County	2018 FEMA Region III Southcentral (Central Lot) QL2 LiDAR	2018	Pending
Kanawha County	2018 FEMA Region III Southcentral (West Lot) QL2 LiDAR	2018	Pending
Kanawha County	2016 FEMA Region III 3DEP WV East QL2 LiDAR	2016	http://data.wvgis.wvu.edu/elevation/
Nicholas County	2018 FEMA Region III SouthCentral (Central Lot) QL2 LiDAR	2018	Pending
Pocahontas County	2018 FEMA HQ LiDAR	2018	http://data.wvgis.wvu.edu/elevation/
Randolph County	2018 FEMA HQ LiDAR	2018	http://data.wvgis.wvu.edu/elevation/
Roane County	2018 FEMA HQ LiDAR	2018	http://data.wvgis.wvu.edu/elevation/
Webster County	2018 FEMA Region III SouthCentral (Central Lot) QL2 LiDAR	2018	Pending

c. Results of CNMS Showing Flood Study Validity

County or City	Detailed Study Stream Mileage			Approximate Study Stream Mileage			Redelineated Study Stream Mileage		
	Unverified	Unknown	Valid	Unverified	Unknown	Valid	Unverified	Unknown	Valid
Braxton County	0	0	25.58	75.87	0	0	0	0	0
Clay County	0	0	0	73.58	0	0	66.65	0	1.88
Pocahontas County	0	0	0	17.48	0	0	0	0	6.71
Randolph County	0	0	0	15.04	0	0	0	0	0
Roane County	0	0	0	53.06	0	0	0	0	0
Nicholas County	8.75	0	0	43.46	0	0	0	0	0
Webster County	0	0	0	96.60	0	0	50.21	0	40.18
Kanawha County	13.73	0	11.93	231.88	0	0	28.44	0	17.98
Total	22.48	0	37.51	606.97	0	0	145.30	0	66.75

Valid: Study is accurate per known data
 Unknown: Validity needs to be assessed
 Unverified: Study needs to be updated

APPENDIX E | ADDITIONAL DATA

d. Dams in the Watershed by County

County	Total
Kanawha County	4
Clay County	2
Roane County	1
Braxton County	1
Pocahontas County	0
Randolph County	0
Nicholas County	0
Webster County	0
Total	8

e. Levees in the Watershed by County

County	Total
Kanawha County	0
Clay County	0
Roane County	0
Braxton County	0
Pocahontas County	0
Randolph County	0
Nicholas County	0
Webster County	0
Total	0

f. Stream Gage Information

Gage ID	Gage Location	County	Years of Record
3194700	Elk River Below Webster Springs, WV	Webster	91
3195500	Elk River at Sutton, WV	Braxton	79
3196500	Birch River at Herold, WV	Braxton	11
3196600	Elk River near Frametown, WV	Braxton	58
3196800	Elk River at Clay, WV	Clay	57
3197000	Elk River at Queen Shoals, WV	Clay	93
3197445	Big Sandy Creek BL LT Hand Creek near Clendenin, WV	Kanawha	0
3197790	Little Sandy Creek near Elkview, WV	Kanawha	0
3197910	Unnamed Trib to Elk Twomile CR near Charleston, WV	Kanawha	0
3197939	Elk Twomile Creek Near Charleston, WV	Kanawha	0
3197950	Elk River at Charleston, WV	Kanawha	3

APPENDIX E | ADDITIONAL DATA

g. County Border Special Flood Hazard Area Floodplain Boundary Tie-In Issues

County Border	Issue/Problem	Stream Reach	Latitude	Longitude
Clay-Kanawha	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Elk River	38° 22' 23.231" N	81° 15' 24.286" W
Clay-Nicholas	Flood Zones Mismatched	Crooked Fork	38° 19' 50.191" N	81° 5' 20.343" W
Clay-Nicholas	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Leatherwood Creek	38° 21' 42.888" N	81° 1' 17.403" W
Clay-Nicholas	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Lilly Fork	38° 23' 18.599" N	80° 57' 57.604" W
Clay-Nicholas	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Buffalo Creek	38° 27' 25.395" N	80° 51' 6.895" W
Clay-Braxton	Pol_Ar Gaps/Overlaps / Flood Zoned Misaligned	Elk River	38° 35' 2.907" N	80° 56' 14.760" W
Clay-Roane	Pol_Ar Gaps/Overlaps / Flood Zoned Misaligned	Cookman River	38° 34' 28.774" N	81° 7' 16.421" W
Clay-Roane	Pol_Ar Gaps/Overlaps / Flood Zoned Misaligned	Elk River	38° 30' 11.865" N	81° 13' 59.381" W
Clay-Kanawha	Flood Zones Mismatched	Lick Branch	38° 32' 18.890" N	81° 19' 45.134" W
Kanawha-Roane	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Little Sandy Creek	38° 32' 48.280" N	81° 25' 24.244" W
Braxton-Nicholas	Flood Zones Misaligned	Strange Creek	38° 31' 52.503" N	80° 50' 7.360" W
Braxton-Nicholas	Flood Zones Misaligned	Birch River	38° 33' 26.904" N	80° 47' 7.203" W
Braxton-Webster	Flood Zones Misaligned	Elk River	38° 37' 21.295" N	80° 32' 15.433" W
Braxton-Webster-Nicholas	Flood Zones Misaligned	Birch River	38° 30' 7.273" N	80° 40' 26.555" W
Pocahontas-Randolph	Flood Zones Misaligned	Elk River	38° 28' 24.415" N	80° 6' 56.776" W
Randolph-Webster	Flood Zones Misaligned	Elk River	38° 31' 31.117" N	80° 11' 3.630" W
Randolph-Webster	Flood Zones Misaligned	Back Fork Elk River	38° 34' 11.494" N	80° 12' 33.627" W
Randolph-Webster	Flood Zones Misaligned	Sugar Creek	38° 35' 31.695" N	80° 13' 16.008" W
Kanawha-Roane	Pol_Ar Gaps/Overlaps / Flood Zoned Mismatched	Pocatalico River	38° 34' 37.710" N	81° 29' 57.520" W

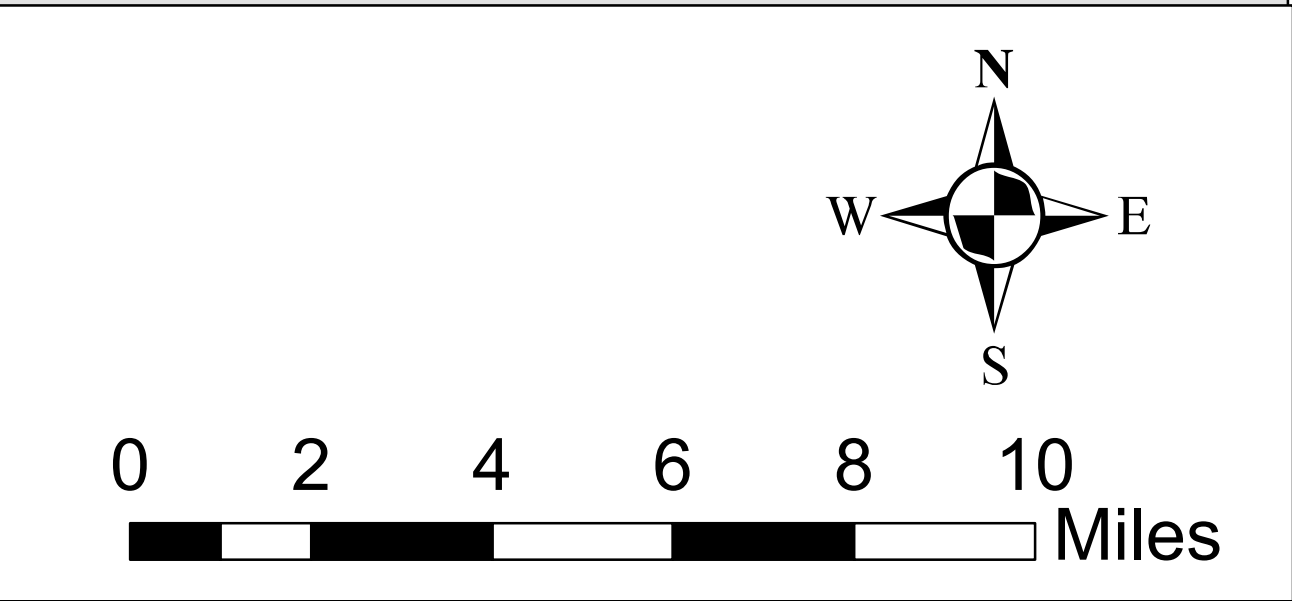
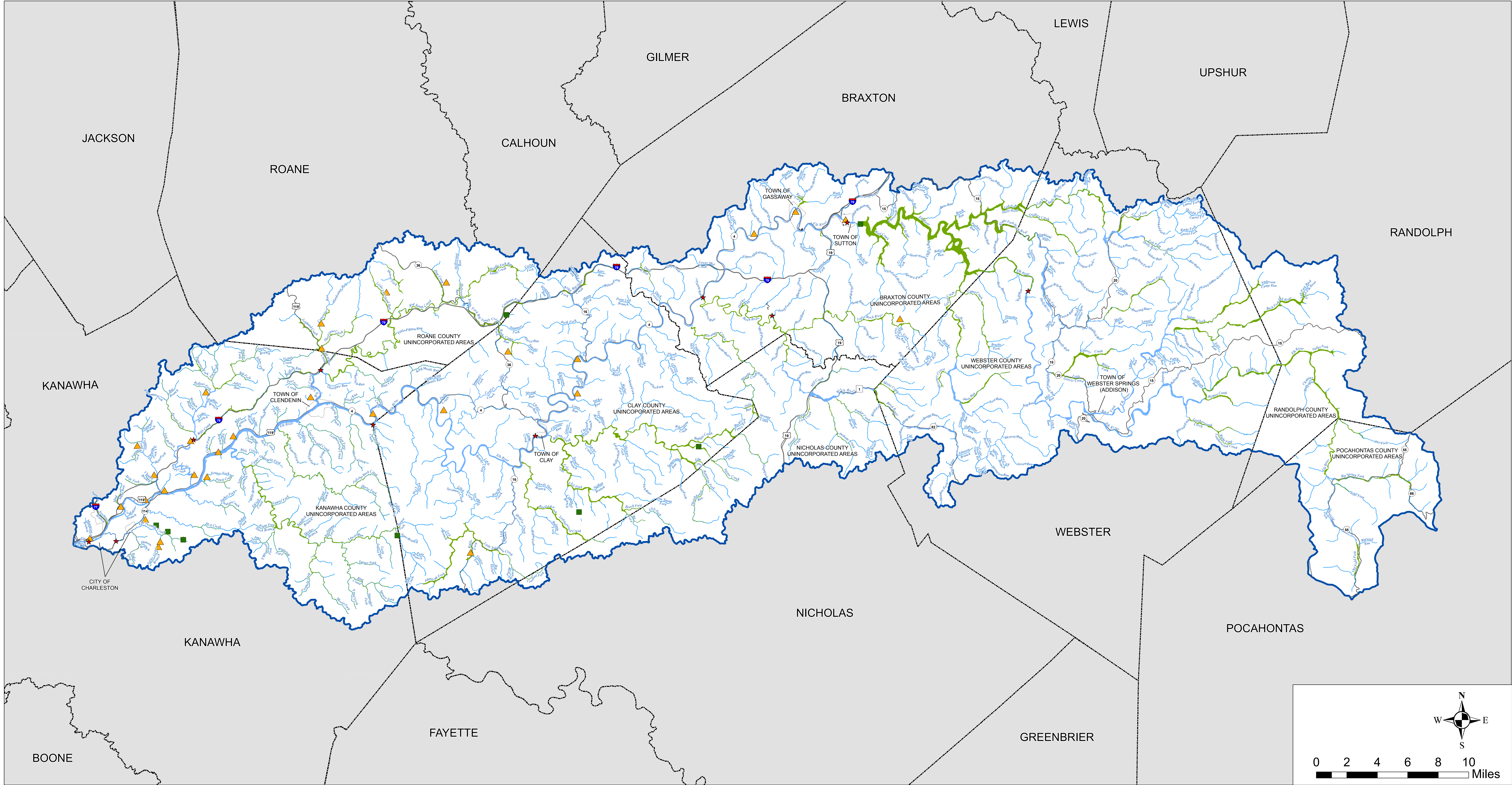
APPENDIX E | ADDITIONAL DATA

h. LOMCs Identified in the Watershed by Jurisdiction

Jurisdiction	Number of Letters of Map Amendment	Number of Letters of Map Revision	Number of Letters of Map Change
Braxton County	24	0	24
Town of Clendenin	2	0	2
Clay County	47	0	47
City of Charleston	7	0	7
Pocahontas County	3	0	3
Randolph County	5	0	5
Roane County	26	0	26
Town of Addison (Webster Springs)	1	0	1
Town of Clay	1	0	1
Nicholas County	3	0	3
Town of Gassaway	2	0	2
Town of Sutton	5	0	5
Webster County	5	0	5
Kanawha County	107	0	107
Total	238	0	238

APPENDIX F | DISCOVERY MAPS

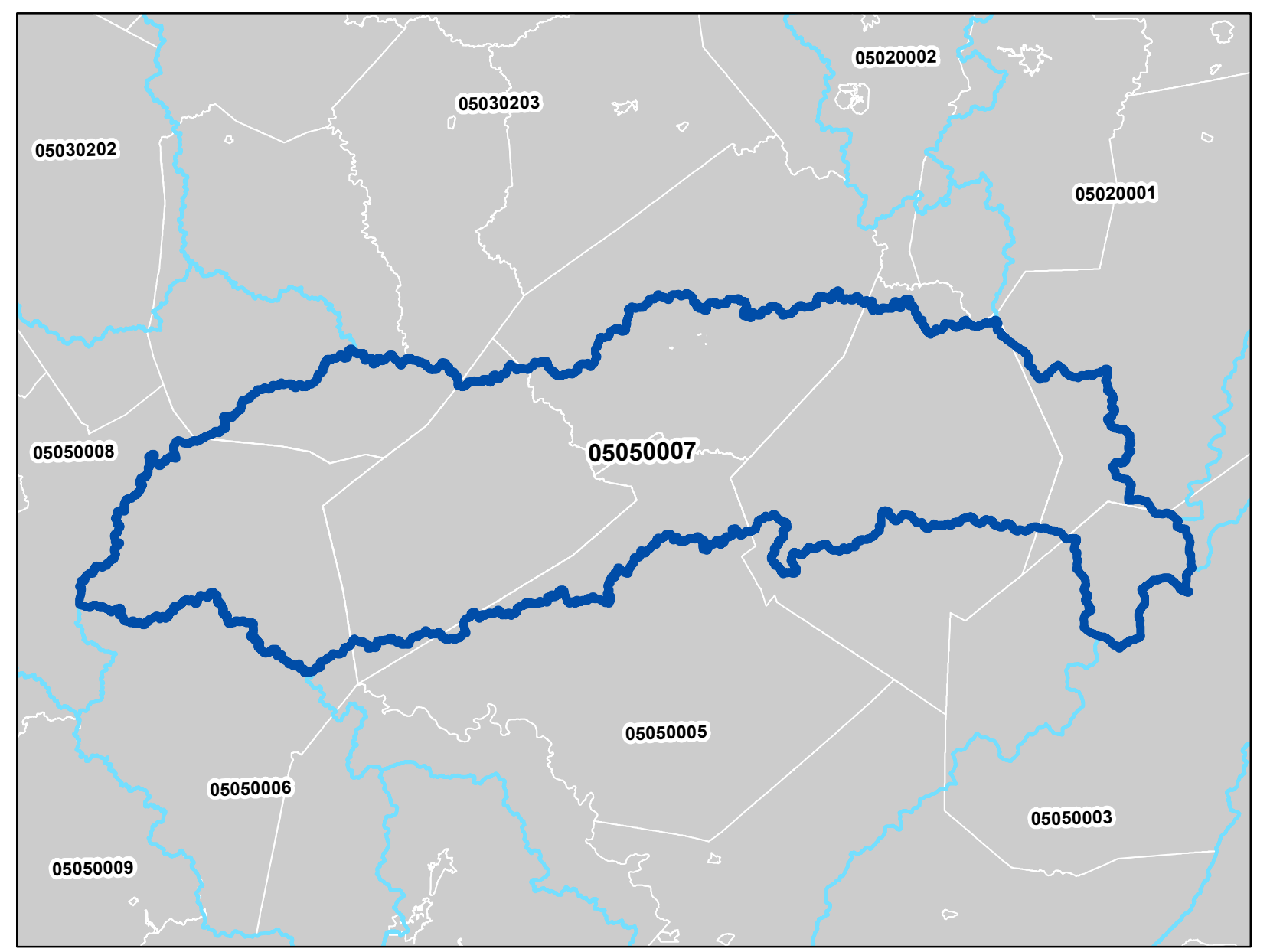
Flood Risk: Elk Watershed



MAP SYMBOLOGY

- Zone A (Approximate 1% Annual Chance)
- Zone AE (Detailed 1% Annual Chance)
- Dam (National Inventory of Dams)
- LOMC (Letter of Map Change) Clusters (4+)
- USGS Stream Gage
- Watershed Boundary
- State Boundary
- Municipal Boundary
- County Boundary
- Stream Line
- Major Road and Highway
- Levee (National Levee Inventory)

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD RISK DISCOVERY MAP

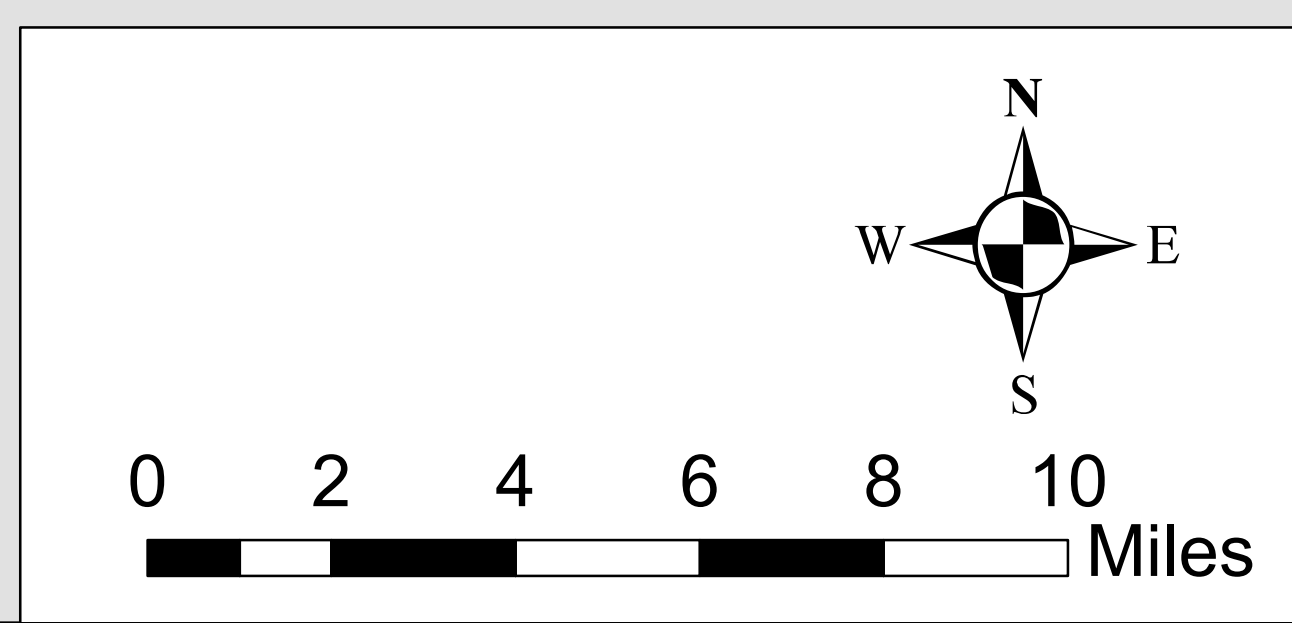
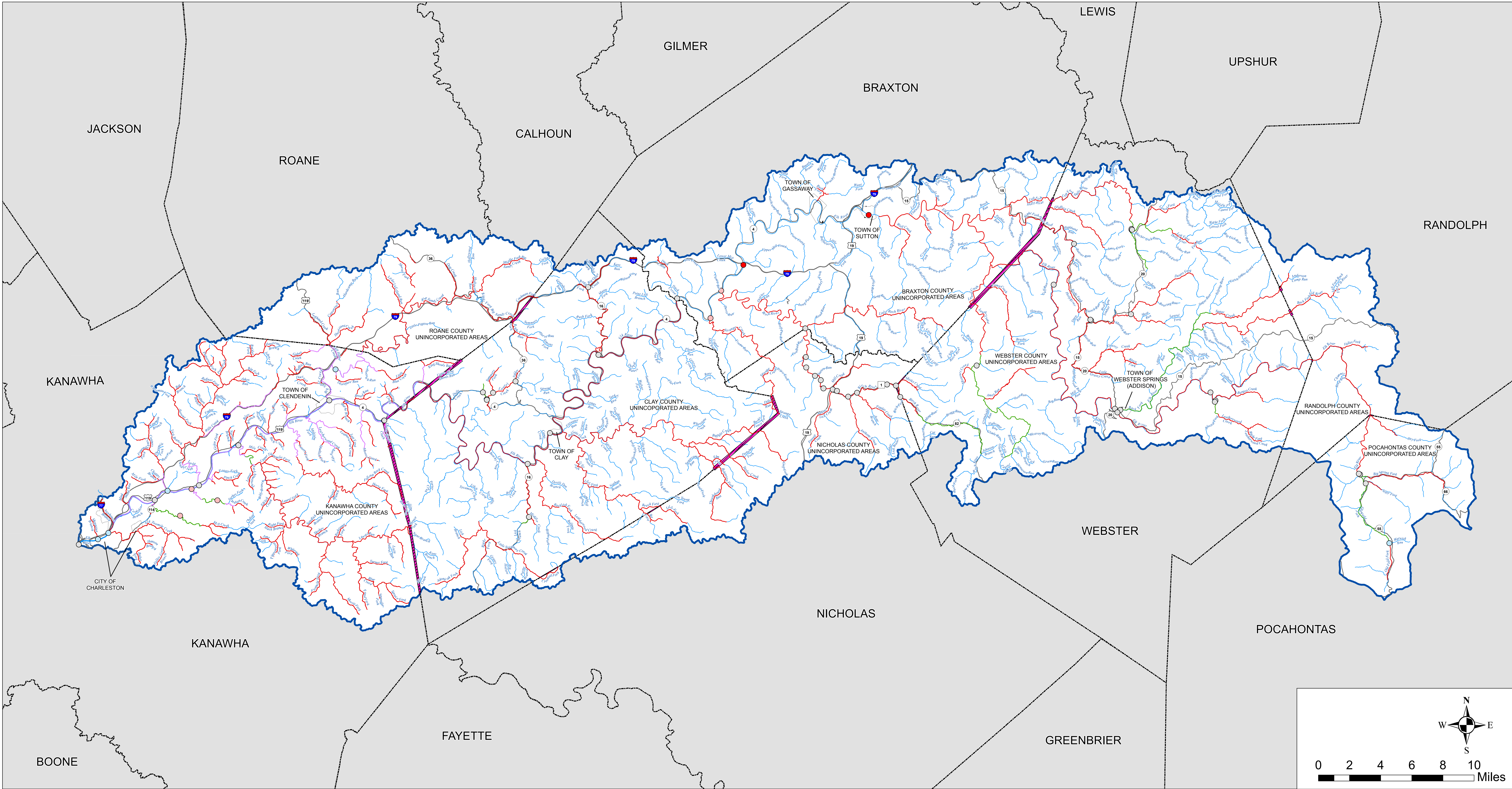
ELK WATERSHED

Study Area:
 BRAXTON COUNTY, WV
 CLAY COUNTY, WV
 KANAWHA COUNTY, WV
 NICHOLAS COUNTY, WV
 POCAHONTAS COUNTY, WV
 RANDOLPH COUNTY, WV
 ROANE COUNTY, WV
 WEBSTER COUNTY, WV



HUC-8 Code
05050007
 RELEASE DATE
JANUARY 2024

Mapping Needs: *Elk Watershed*



MAP SYMBOLOGY

Coordinated Needs Management Strategy (CNMS) Validation Status

- BEING STUDIED (Pink hatched)
- NVUE COMPLIANT (Green)
- TO BE ASSESSED (Red)
- TO BE STUDIED (Blue)

Other

- Watershed Boundary (Blue outline)
- State Boundary (Yellow outline)
- Municipal Boundary (Black outline)
- County Boundary (Black outline)
- Stream Line (Blue line)
- Major Road and Highway (Black line)
- Special Flood Hazard Area Matching Issues (Pink hatched)

FIS Discharge Standard Deviation from Regression Equations

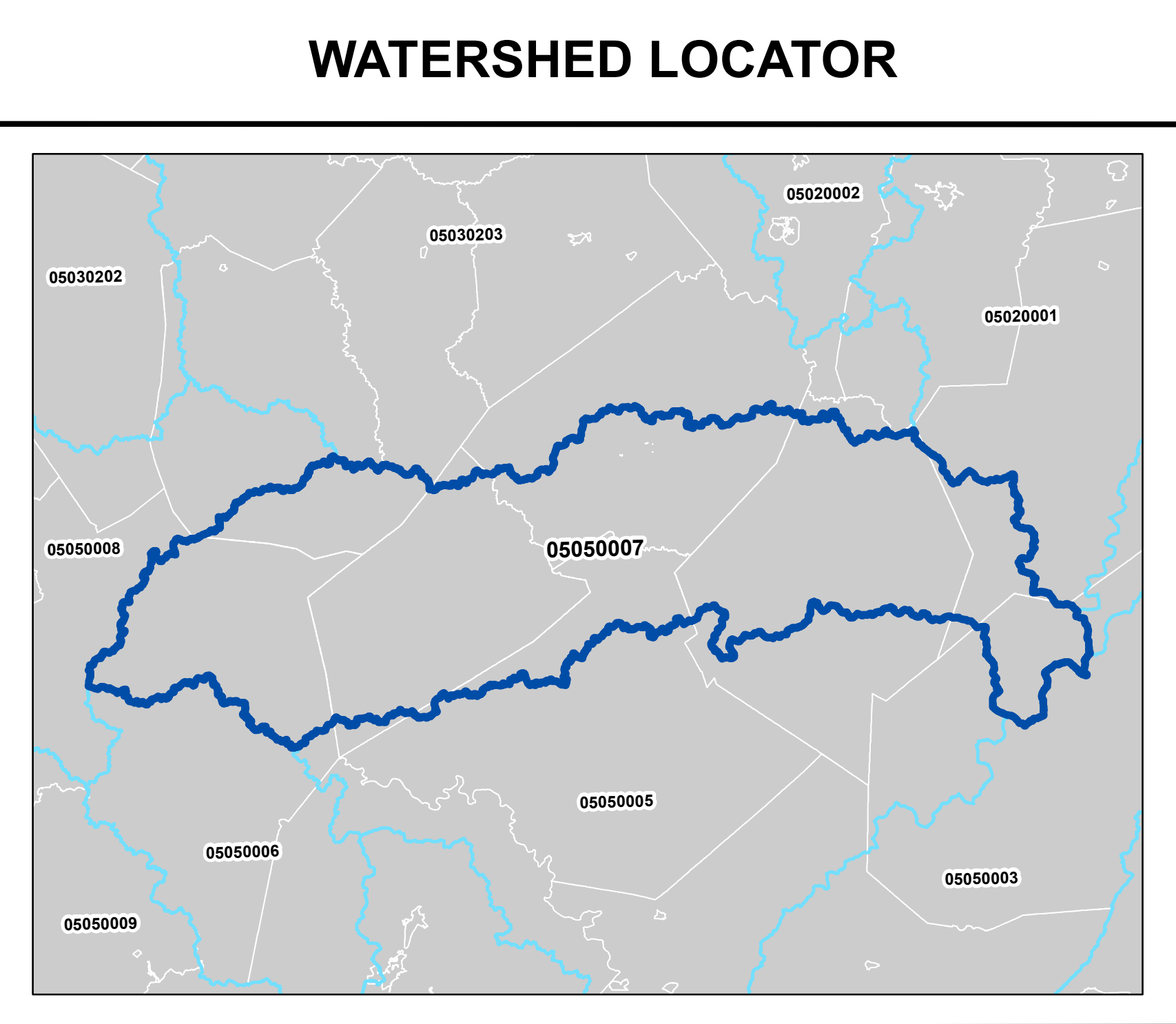
- 2 (Red circle)
- 1 (Pink circle)
- 0 (White circle)
- 1 (Blue circle)
- 2 (Dark blue circle)

ELEVATION DATA AVAILABLE FOR THE ELK WATERSHED

USGS acquired West Virginia LiDAR FEMA Region III 3DEP WV East QL2 LiDAR for Kanawha County in 2016.

USGS acquired West Virginia LiDAR FEMA HQ LiDAR for Roane, Randolph, and Pocahontas Counties in 2018.

USGS to acquire West Virginia 2018 FEMA Region III South Central QL2 LiDAR for Braxton, Clay, Kanawha, Nicholas, and Webster Counties in 2021.



NATIONAL FLOOD INSURANCE PROGRAM

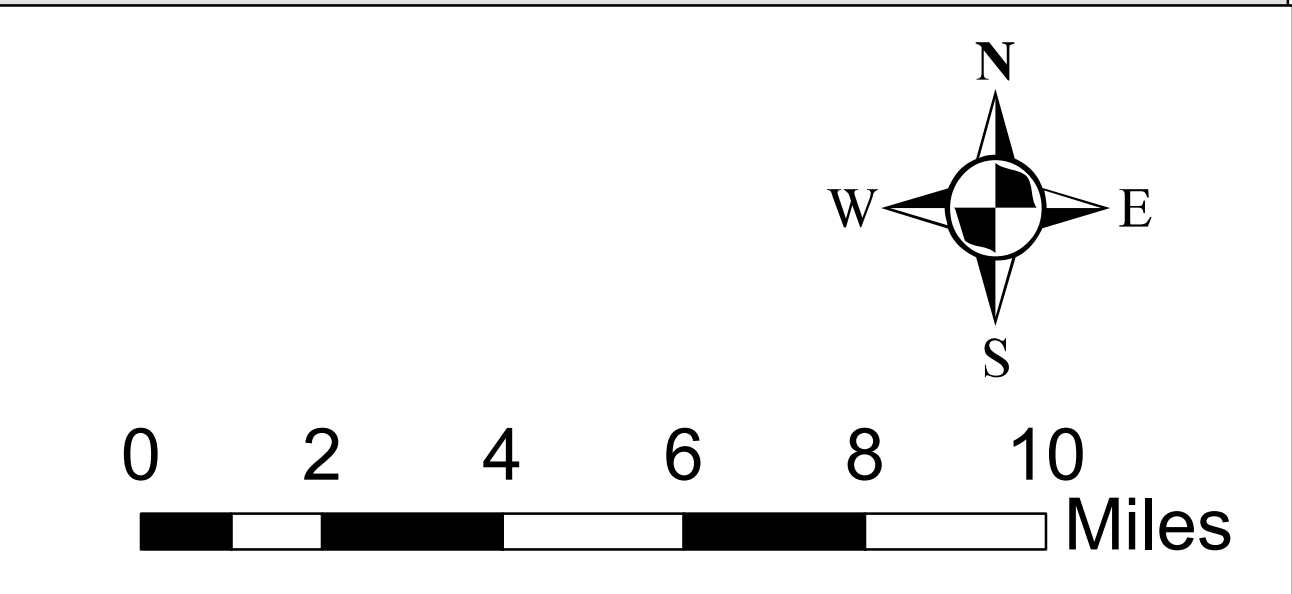
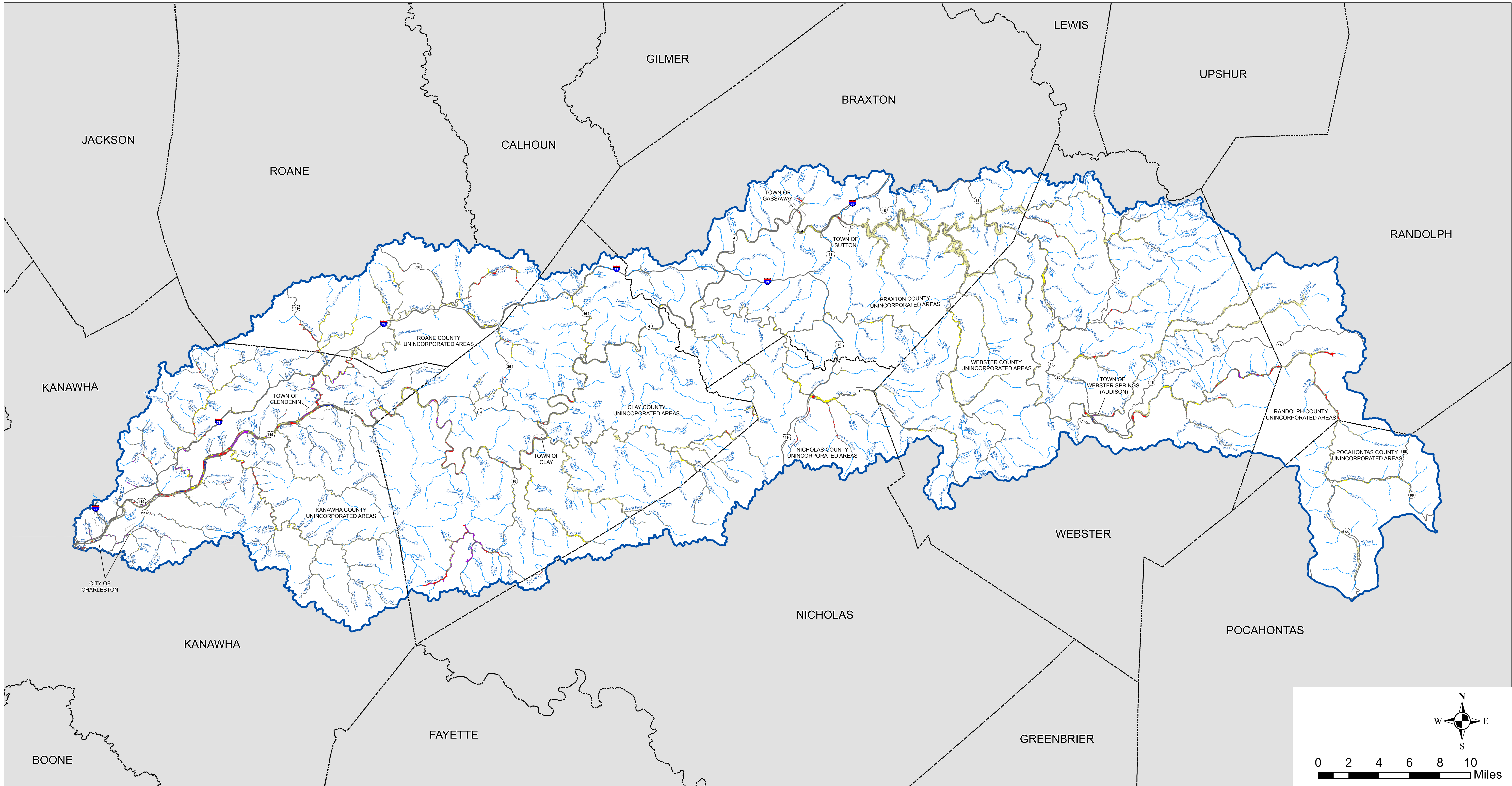
FLOOD RISK DISCOVERY MAP

ELK WATERSHED

Study Area:
 BRAXTON COUNTY, WV
 CLAY COUNTY, WV
 KANAWHA COUNTY, WV
 NICHOLAS COUNTY, WV
 POCAHONTAS COUNTY, WV
 RANDOLPH COUNTY, WV
 ROANE COUNTY, WV
 WEBSTER COUNTY, WV

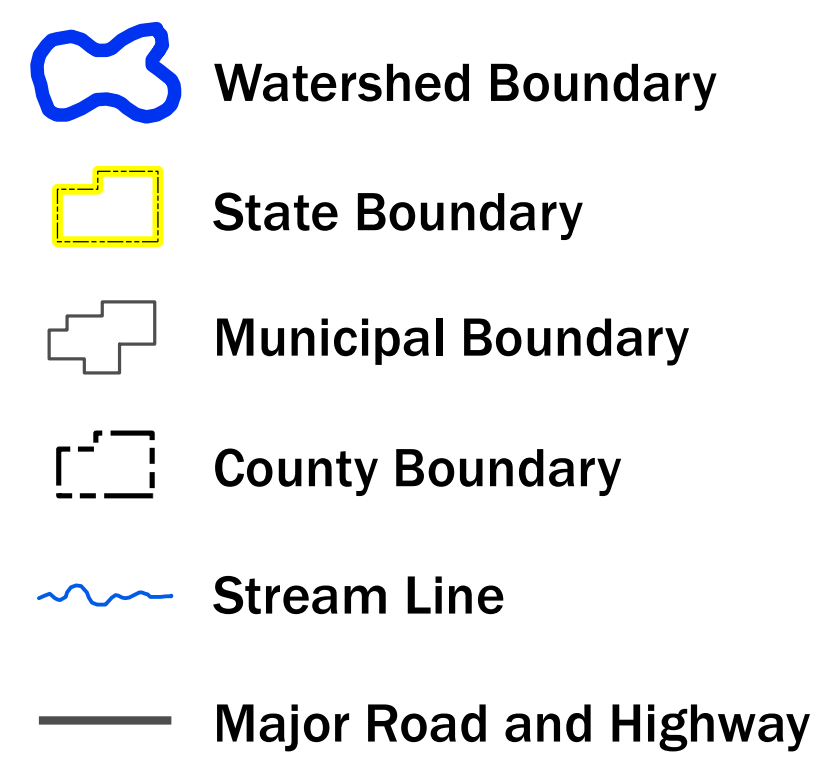
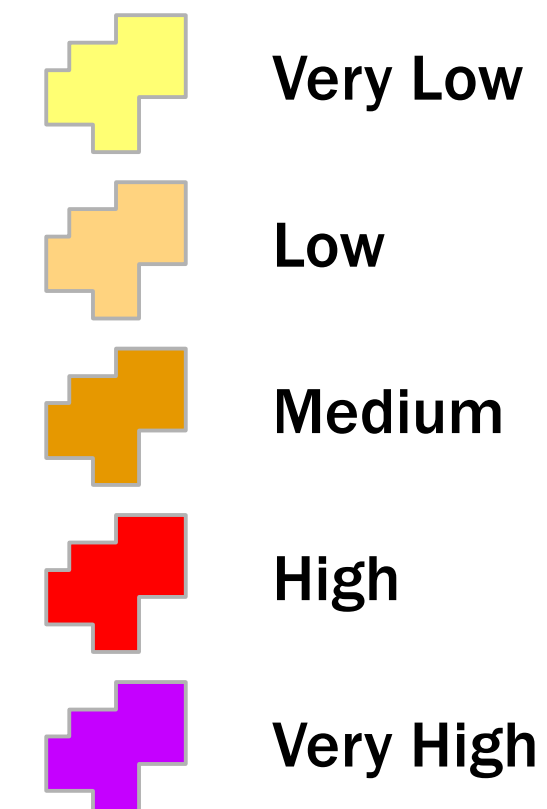
HUC-8 Code
05050007
 RELEASE DATE
JANUARY 2024

Potential Loss: Elk Watershed



MAP SYMBOLOGY

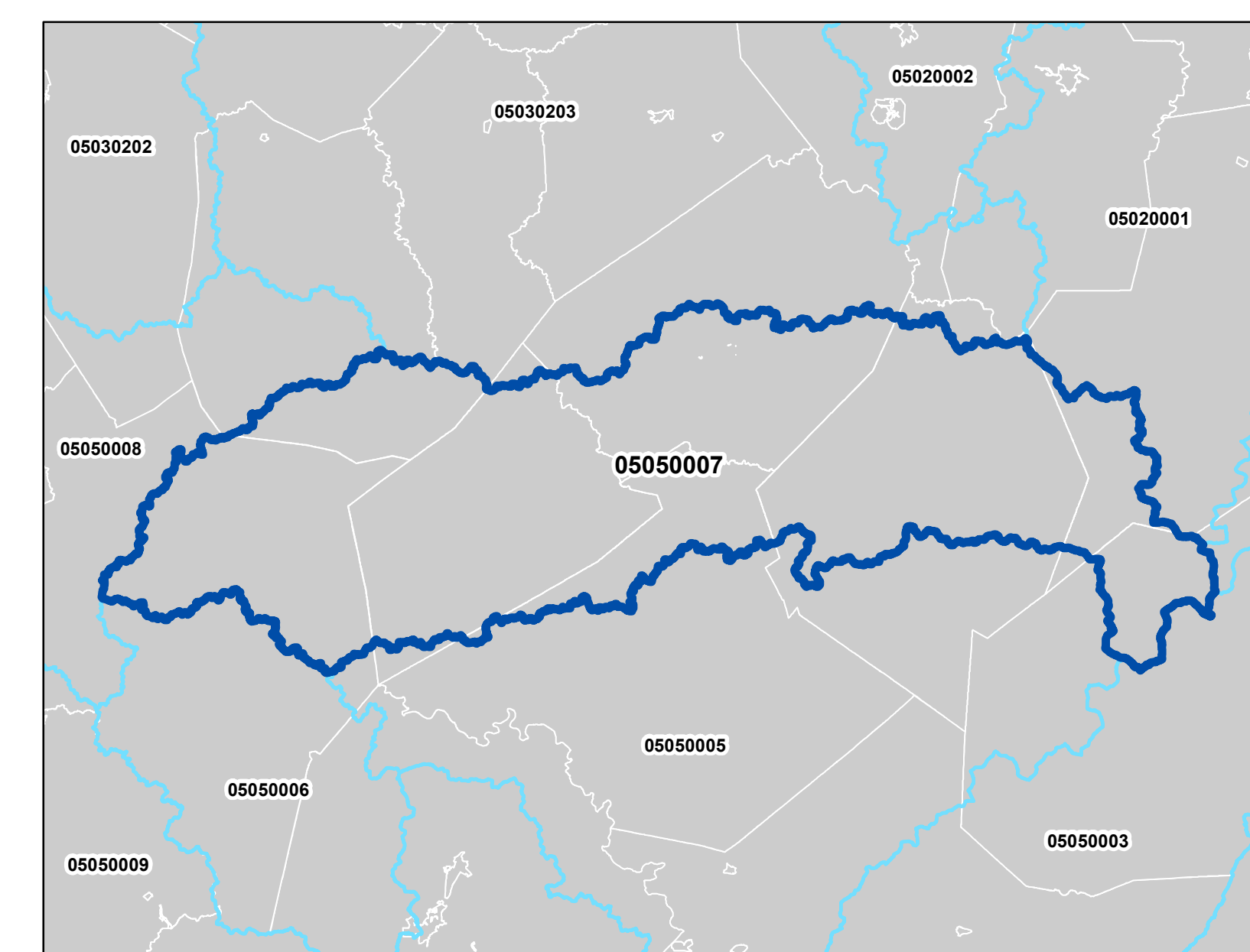
Total Exposure in Floodplain (TEIF) Loss
(per census block):



NUMBER OF REPETITIVE LOSSES

NUMBER OF FLOOD INSURANCE POLICIES

WATERSHED LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD RISK DISCOVERY MAP

ELK WATERSHED

Study Area:

BRAXTON COUNTY, WV
 CLAY COUNTY, WV
 KANAWHA COUNTY, WV
 NICHOLAS COUNTY, WV
 POCAHONTAS COUNTY, WV
 RANDOLPH COUNTY, WV
 ROANE COUNTY, WV
 WEBSTER COUNTY, WV



FEMA

HUC-8 Code
05050007

RELEASE DATE
JANUARY 2024

APPENDIX G | MEETING MINUTES

**MEETING SYNOPSIS:
COAL, ELK, LOWER KANAWHA, AND UPPER KANAWHA WATERSHEDS FLOOD RISK
DISCOVERY MEETING**

Meeting Details

Date	05/02/2023		Time	10:00 – 11:30 a.m.
Watershed	Coal, Elk, Lower Kanawha, Upper Kanawha		Location	RETI Center, 2nd Flood Classroom 89 Richard D. Minnich Drive, Sutton, WV 26601
Total Community Sign-Ins	2		Communities Represented	Braxton County, Town of Sutton
Total Non-Community Sign-Ins <i>(e.g., Federal, State, Regional organizations or NGOs)</i>	7		Entities Represented	Federal: FEMA Region III State: West Virginia State NFIP Regional: Huntington District USACE
Format	The meeting opened with a formal presentation/slide-show followed by a Discovery Map review and comment exercise.		Materials Shared	<ul style="list-style-type: none"> • Agenda • PowerPoint Presentation: Agenda, Introductions, the NFIP and Flood Risk Data, Project Area Overview, Risk MAP Program and Discovery Overview, Reducing Risk in Communities, Next Steps, Watershed Discovery Maps, Risk and Action Identification Exercise • Discovery Maps: Flood Risk, Mapping Needs, Potential Loss



FEMA

Coal, Elk, Lower Kanawha, and Upper Kanawha Watersheds Flood Risk Discovery Meeting Minutes

Tuesday, May 2, 2023
10:00 – 11:30 a.m.

89 Richard D. Minnich Drive, Sutton, WV 26601

Attendees

FEMA Region III

- Bob Pierson

FEMA Region III Outreach Partners

- Crystal Smith
- Madison Matera

West Virginia NFIP

- Ruthie Maniscalchi
- Julia Sears

USACE Huntington District

- Ben Romans
- Hannah Smith

Braxton County

- John Hoffman

Town of Sutton

- Jonnathan Crum

Welcome and Introductions

- Introductions were made for the presenters of the meeting:
 - Crystal Smith, Program Specialist
 - Bob Pierson, FEMA Project Officer
- Agenda Overview
 - Welcome and Overview
 - The National Flood Insurance Program and Flood Risk Data
 - Flood Risk Study Project and Discovery Overview
 - Reducing Flood Risk in Communities
 - Next Steps
 - Risk and Action Identification Exercise

Presentation

See the presentation for the slides that align with the notes throughout this section.

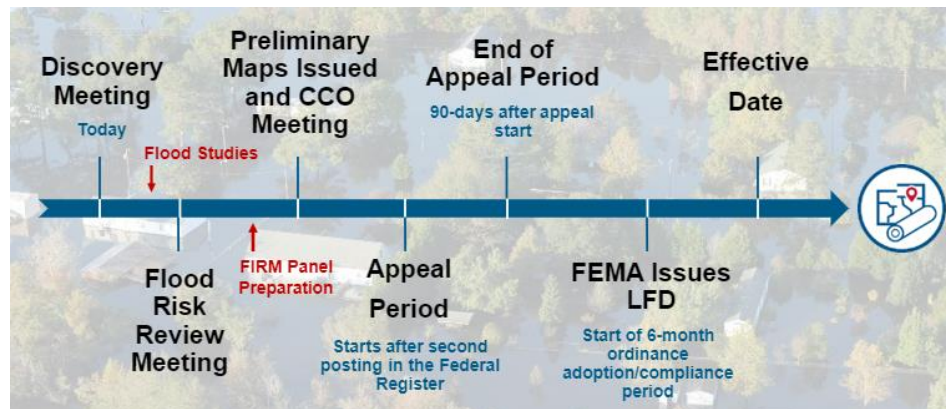
The National Flood Insurance Program and Flood Risk Data

- An overview was provided of the National Flood Insurance Program (NFIP), which allows property owners to purchase flood insurance at a reduced rate when communities adopt and enforce floodplain management ordinances based on current flood maps.
- Over 22,616 communities participate in the NFIP, with over 5 million policies. There are around 14,700 policies in West Virginia.
- Flood Risk Data for West Virginia can be accessed by the following platforms:
 - The West Virginia Flood Tool at <https://www.mapwv.gov/flood/>
 - FEMA's Flood Map Service Center (MSC) at <https://msc.fema.gov/portal/home>
 - National Flood Hazard Layer (NFHL) at <https://www.fema.gov/flood-maps/national-flood-hazard-layer>

Flood Risk Study Project and Discovery Overview

- The goal of the Risk MAP program is to deliver quality flood hazard data that helps communities increase public awareness and leads to action that reduces risk to life and property.
- FEMA has decided to update the existing maps due to factors such as the recent availability of high-resolution elevation data (Light Detection and Ranging [LiDAR]), the advanced age of effective flood studies for non-coastal areas, new hydrologic calculations, affordable model-backed Zone A flood studies, and ability to provide new flood risk products.
- Many different types of data are collected and analyzed before the Discovery meeting, including:
 - Watershed and Jurisdiction Boundaries
 - Dams and Levees
 - Stream Data

- Declared Disasters
- Effective Floodplains: Special Flood Hazard Areas
- The typical Risk MAP project takes an average of 3-5 years to complete.



- The goal of the Discovery phase is to share information to communities and learn about flood risk and mitigation activities and capabilities.
- Outcomes of the Discovery process include a Discovery report, Discovery maps, and identification of potential study areas.

Reducing Flood Risk in Communities

- Specialized flood risk dashboards are available and will be distributed to each community within the four watersheds being studied. These dashboards provide communities with a snapshot of their flood risk as well as their financial risk.
- Ways a community can improve their resilience to flooding were shared, including:
 - Improving and implementing Hazard Mitigation Plans
 - Influencing decisions about development, ordinances, and flood mitigation projects
 - Communicating with citizens about flood risk
- Implementing hazard mitigation actions can save communities money in the long run. By implementing higher standards in a floodplain management ordinance, communities can experience a benefit-cost ratio of \$5: \$1. Additionally, for every \$1 spent on federally funded actions that reduce riverine flood risk, \$7 is saved.

Next Steps

- Information provided by communities is crucial to the Risk MAP process. Requested information includes:
 - Completed Discovery data questionnaire, with GIS contact
 - Areas of Concern
 - Areas of historical flooding and other flood risks
 - Mitigation projects addressing flood risks
 - Ideas about ways to increase resilience

Closing

Project contacts were provided to meeting attendees, and a quick live demo was preformed of the West Virginia Flood Tool.

Action Items

1. Participants will:
 - a. Complete and submit Discovery data questionnaires to FEMA, with GIS contact information
 - b. Provide areas of concern, including areas of recent or planned development and areas of high growth or other significant land changes
 - c. Provide information about areas of historical flooding and other flood risks
 - d. Provide information about mitigation projects that address flood risks
 - e. Provide ideas to increase their community's resilience to flooding, such as training, cost-efficient mitigation, and integration with hazard mitigation planning
2. FEMA and Partners will:
 - a. Have follow-up discussions with communities regarding areas to be updated
 - b. Provide a copy of the final Discovery report and meeting materials to all meeting participants and communities

Contacts

FEMA Region III

Robert Pierson
Project Officer
Robert.Pierson@fema.dhs.gov
267-319-6340

Elizabeth Ranson
Mitigation Planning
Elizabeth.Ranson@fema.dhs.gov
215-347-0686

State Partners

Timothy W. Keaton
State NFIP Coordinator
Tim.W.Keaton@wv.gov
304-414-7659

Kurt Donaldson, GISP, CFM
Manager, WVGISTC
Kurt.Donaldson@mail.wvu.edu
304-293-9467

Mapping Partners

Crystal Smith
Program Specialist
Crystal.Smith@wsp.com

Madison Matera
Program Specialist
Madison.Matera@wsp.com

Questions/Comments

Question: Are there additional resources available for use besides the West Virginia Flood Tool?

Answer: There are more federal sources available, however, they have similar information to the WV Tool. The WV Tool has more information than the FEMA sources, therefore it is the best source to use. The map changes will be implemented into the flood tool as well.

Comment: It is really important to communicate with communities, especially in the southern part of the state, in order to get community buy in when hosting meetings.

Question: During the flooding that occurred in the area in 2016, were there any areas that flooded that were unexpected? If so, why was it unexpected?

Answer: The disaster that occurred in 2016 matched up with the FEMA storm footprint. It was an 80-90 year flood and there was a massive amount of rain in a small area.

Comment: There are issues with drains and culverts in the area not being cleared. There is a lot of debris building up causing drain lines to be clogged, and an overgrowth of streams. There needs to be maps that correlate to these issues, and permanent solutions.

Comment: The Town of Sutton noted issues with runoff. They are trying to map where the runoff is occurring, however, they do not have the budget to fix the issue, which has been neglected for years.

Comment: There should be targeted outreach and education to people identified to live in an area that has a high flood risk, to ensure they are aware of risk and can be provided with resources.

Comment: When looking at flood risk, it is important to look at the topography of the region, not just the drains and culverts. Sometimes the water just has nowhere to go, and the drains may not be helping even if they are clear.

Comment: The Kanawha River near highway Route 5 and the dam floods constantly. There are 7-13 retention ponds to help, however it doesn't seem like they are effective. This flooding does not necessarily seem to cause any emergency situation.

APPENDIX H | MEETING ATTENDANCE RECORD



FEMA

Discovery Meeting – Coal, Elk, Lower Kanawha, and Upper Kanawha Watersheds

Date / Time: May 2, 2023 – 10am

Location: RETI Center, 2nd Flood Classroom, 89 Richard D. Minnich Drive, Sutton, WV 26601

First Name	Last Name	Affiliation	Email	Sign-In
Jonnathan	Crum	Town of Sutton	Jonathan.m.crum@gmail.com	
John	Hoffman	Braxton County OES	Braxton.oes801@gmail.com	
Hannah	Smith	USACE	Hannah.g.smith@usace.army.mil	
Ben	Romans	USACE	Benjamin.e.romans@usace.army.mil	
Ruthie	Maniscalchi	State NFIP	Ruthie.a.maniscalchi@wv.gov	
Julia	Sears	State NFIP	Julia.r.sears@wv.gov	
Bob	Pierson	FEMA R3	Robert.Pierson@fema.dhs.gov	
Madison	Matera	WSP	Madison.matera@wsp.com	
Crystal	Smith	WSP	Crystal.smith@wsp.com	

** For a complete list of all invited stakeholders, please refer to the Community Contact List – CERC.xlsx that is delivered to FEMA’s Mapping Information Platform (MIP) in conjunction with this report under case number 19-03-00055 (within the Elk Discovery Preparation subfolder).

APPENDIX I | MEETING PRESENTATION

RiskMAP
Increasing Resilience Together



Coal, Elk, Lower & Upper Kanawha Watershed Flood Risk Discovery Meeting

FEMA REGION III
May 2 - 3, 2023



FEMA

Why Are We Here?

- **Discuss flood risk changes**
- **Gather local information**
- **Collaborate on planning, taking action, and communicating risk**



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Increasing Resilience Together

Agenda

- **Welcome and Overview**
- **The National Flood Insurance Program and Flood Risk Data**
- **Flood Risk Study Project and Discovery Overview**
- **Reducing Flood Risk in Communities**
- **Next Steps**
- **Risk and Action Identification Exercise**



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Introductions

- **Name**
- **Municipality or organization**
- **Role in floodplain management**



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The National Flood Insurance Program and Flood Risk Data



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National Flood Insurance Program (NFIP)

- Allows property owners to purchase flood insurance at reduced rates
- State and local governments agree to adopt and enforce floodplain management ordinances
- Over **22,616 communities** participate in the NFIP*
- Over **5 million policies in the NFIP**, >14,700 in WV*

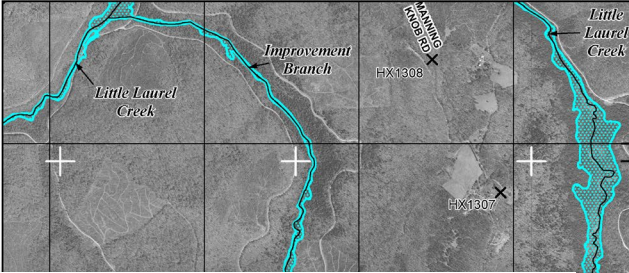
*Data current as of April 2023: FEMA Community Status Book.



Flood Insurance Rate Maps and Studies

Key Terms:

- Flood Insurance Rate Map (**FIRM**)
- Flood Insurance Study (**FIS**) Report
- Special Flood Hazard Area (**SFHA**)
- Flood Zone
- Base Flood Elevation (**BFE**)
- Regulatory Floodway
- Cross Section



FLOOD INSURANCE STUDY

GREENBRIER COUNTY, WEST VIRGINIA AND INCORPORATED AREAS


COMMUNITY NAME	COMMUNITY NUMBER
CORPORATION OF FALLING SPRINGS (TOWN OF SENICK)	540243
GREENBRIER COUNTY (UNINCORPORATED AREAS)	540040
*LEWISBURG, CITY OF	540281
*QUINWOOD, TOWN OF	540244
RANELLE, TOWN OF	540228
RONCEVERTE, CITY OF	540043
RUPERT, TOWN OF	540044
WHITE SULPHUR SPRINGS, CITY OF	540045

*No Special Flood Hazard Areas Identified

FEDERAL EMERGENCY MANAGEMENT AGENCY

EFFECTIVE DATE: OCTOBER 16, 2012

FLOOD INSURANCE STUDY NUMBER
54025CV000A



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0075E

FIRM
FLOOD INSURANCE RATE MAP

GREENBRIER COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 75 OF 800
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GREENBRIER COUNTY	0000	075	E

Notice to User: The Map Number shown below should be used when placing map orders. The Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
54025C0075E

EFFECTIVE DATE
OCTOBER 16, 2012

Federal Emergency Management Agency

This is an official FIRMeX showing a portion of the above-referenced flood map created from the MSC FIRMeX Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <http://www.fema.gov>.



Typical FIRM Panel and Flood Zones

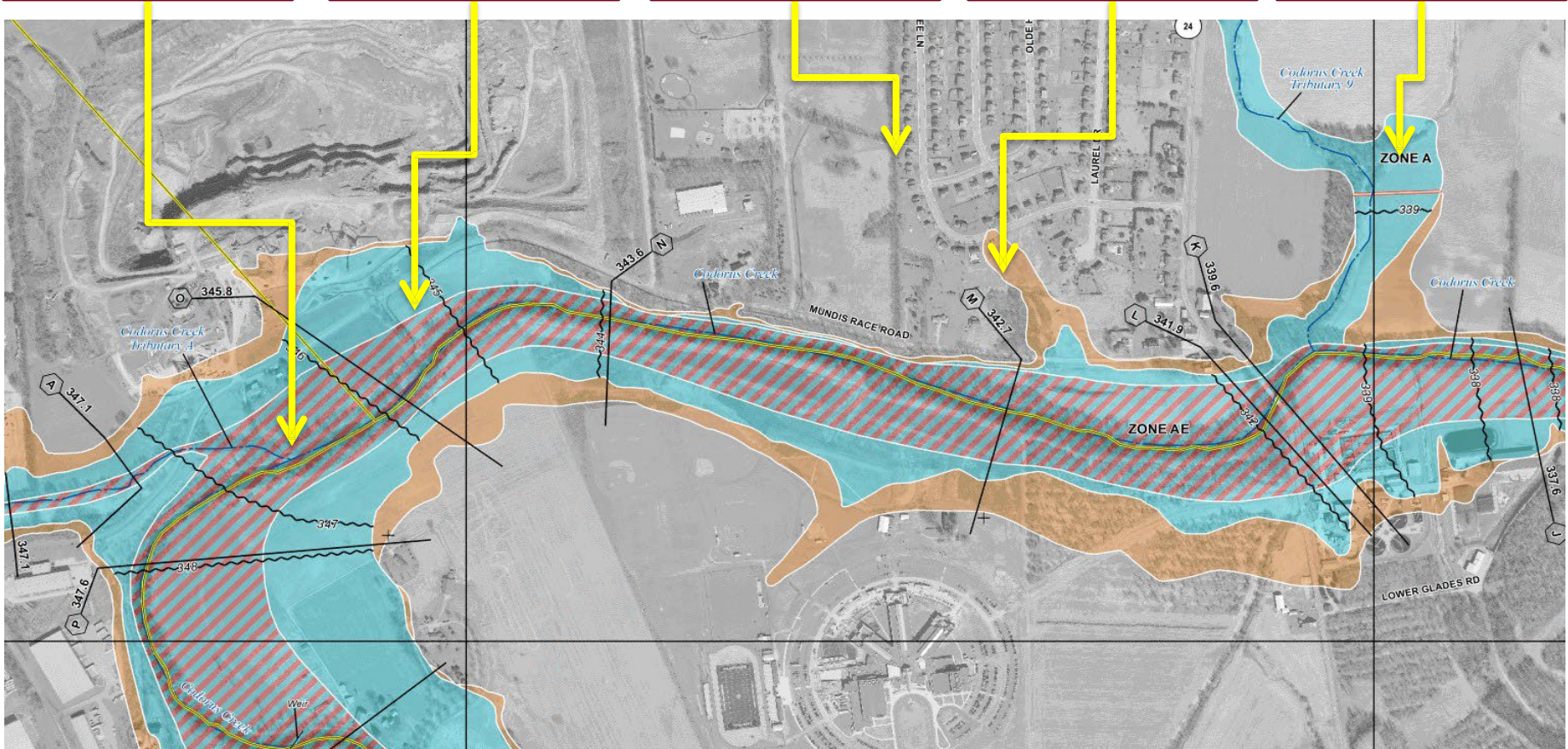
Zone AE
Floodway

Zone AE

Zone X

Shaded
Zone X

Zone A



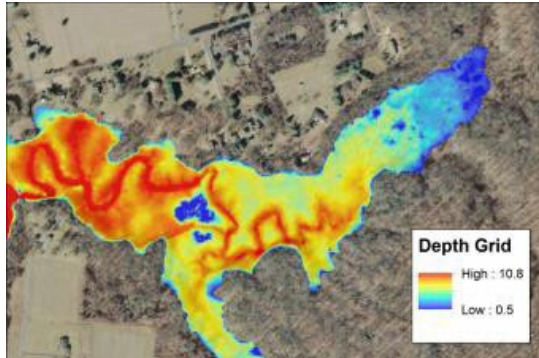
FEMA

Study Types

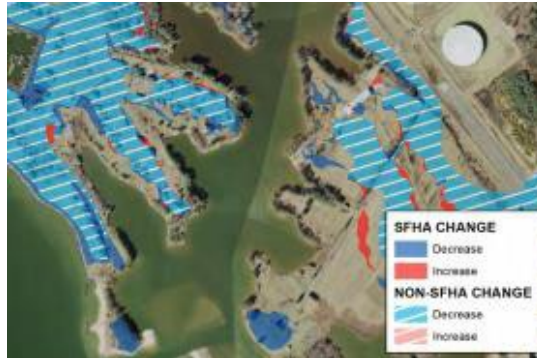
		Approximate (Zone A)	Detailed (Zone AE)
Survey	Channel XS	None	Field survey at road crossings
	Hydraulic Structures	None	Field survey
Hydrology	Methodology	Historically regression equations with gage analysis where applicable - Alternate methods such as HEC-HMS or Rainfall Run off	
Hydraulics	Recurrence Interval	10%, 4%, 2%, 1%, 1%+ and 0.2% annual chance	
	Manning's "n"	Aerial Imagery (Horizontal Variation)	
	Channel Geometry	LiDAR	LiDAR; Supplemented with field survey
Mapping	Boundaries	1% annual chance	1% and 0.2% annual chance
	Flood Zones	Zone A (no published BFEs)	Zone AE (all XS with labeled WSELs, and Floodways) and 'Shaded' Zone X
FIS Report	Tables	Study Summaries, Summary of Discharges	Study Summaries, Summary of Discharges, Floodway Data, Roughness Coefficient
	Profiles	None	10-, 4-, 2-, 1-, 1+, and 0.2% annual chance

FEMA Flood Risk GIS Datasets

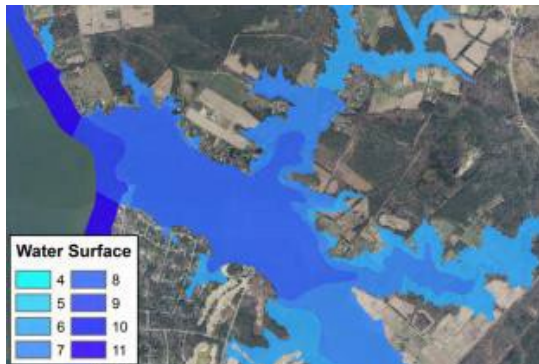
**Flood Depth
& Analysis
Grids**



**Changes
Since
Last FIRM**



**Water
Surface
Elevation
Grids**



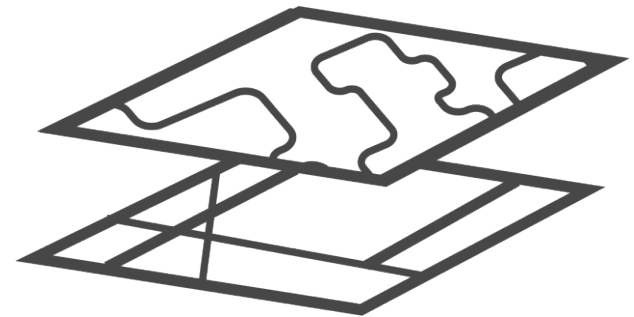
**Flood Risk
Assessment**



FEMA

Where to Find Flood Risk Data

- **WV Flood Tool**
 - Digital mapping source publicly available that shows property-level flood risk
- **FEMA's Flood Map Service Center (MSC)**
 - Where you can view effective maps online for free
- **National Flood Hazard Layer (NFHL)**
 - Geospatial database that contains current effective flood hazard data



Where Can I Find My Flood Maps?

The FEMA Map Service Center (MSC) is the official public source for flood hazard information: <https://msc.fema.gov/portal/home>

The screenshot shows the FEMA Flood Map Service Center website. At the top, it says "FEMA Flood Map Service Center". Below that is a link "Looking for a Flood Map?". A red callout box with the text "Enter an address for location search" has an arrow pointing to the search input field. The input field is labeled "Enter an address, a place, or longitude/latitude coordinates:" and contains the placeholder text "Enter an address, a place, or longitude/latitude coordinates". To the right of the input field is a blue "Search" button. Below the input field, there is a link "Looking for more than just a current flood map? Visit [Search All Products](#) to access the full range of flood risk products for your community." The "Search All Products" link is also circled in red. To the right of the text is a small image of a flood map showing various zones and labels like "FLOODWAY" and "300-400".



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National Flood Hazard Layer

Visit <https://www.fema.gov/national-flood-hazard-layer-nfhl> for multiple options to view and download NFHL data.

Accessing the National Flood Hazard Layer

Map Service Center

Access localized National Flood Hazard Layer data by searching FEMA's Map Service Center.

[FEMA's Map Service Center](#)

NFHL ArcGIS Viewer

Or you may view, download, and print current local digital effective flood hazard data in an ArcGIS map.

[NFHL Viewer](#)

In the [NFHL Viewer](#), you can use the address search or map navigation to locate an area of interest and the NFHL Print Tool to download and print a full Flood Insurance Rate Map (FIRM) or FIRMette (a smaller, printable version of a FIRM) where modernized data exists. Technical GIS users can also utilize a series of dedicated GIS web services that allow the NFHL database to be incorporated into websites and GIS applications. For more information on available services, go to the [NFHL GIS Services User Guide](#).

You can also use the address search on the [FEMA Flood Map Service Center \(MSC\)](#) to view the NFHL data or download a FIRMette. Using the "Search All Products" on the MSC, you can download the NFHL data for a County or State in a GIS file format. This data can be used in most GIS applications to perform spatial analyses and for integration into custom maps and reports. To do so, you will need GIS or mapping software that can read data in shapefile format.

FEMA also offers a download of a KMZ (keyhole markup file zipped) file, which overlays the data in Google Earth™. For more information on using the data in Google Earth™, please see [Using the National Flood Hazard Layer Web Map Service \(WMS\) in Google Earth™](#).

Draft National Flood Hazard Layer

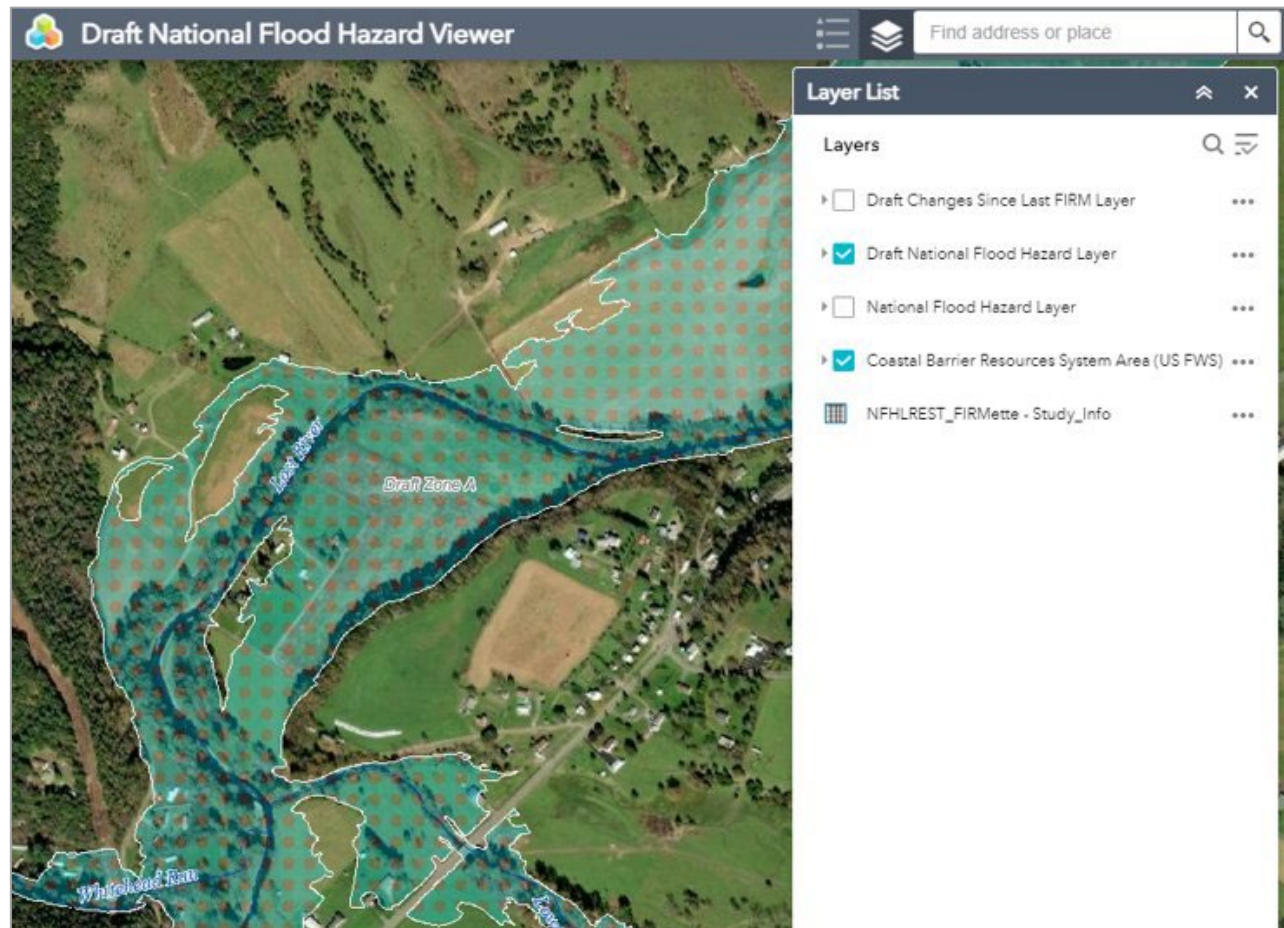
The [Draft National Flood Hazard Layer](#) is for early awareness of possible changes to regulatory flood map information. Until the data becomes effective and it appears in the National Flood Hazard Layer, the data cannot be used to rate flood insurance policies or enforce the federal mandatory purchase requirement.


Preliminary Flood Hazard Data

Preliminary flood hazard data provides the public an early look at their home or community's projected risk to flood hazards. Preliminary data may include new or revised Flood Insurance Rate Maps (FIRM), Flood Insurance Study (FIS) Reports and FIRM Databases. [View your community's preliminary flood hazard data.](#)

Pending Flood Hazard Data

Pending flood hazard data provides the public an early look at their home or community's projected risk to flood hazards. Pending data may include new or revised Flood Insurance Rate Maps (FIRM), Flood Insurance Study (FIS) Reports and FIRM Databases. [View your community's preliminary flood hazard data.](#)





Flood Risk Study Project and Discovery Overview



FEMA

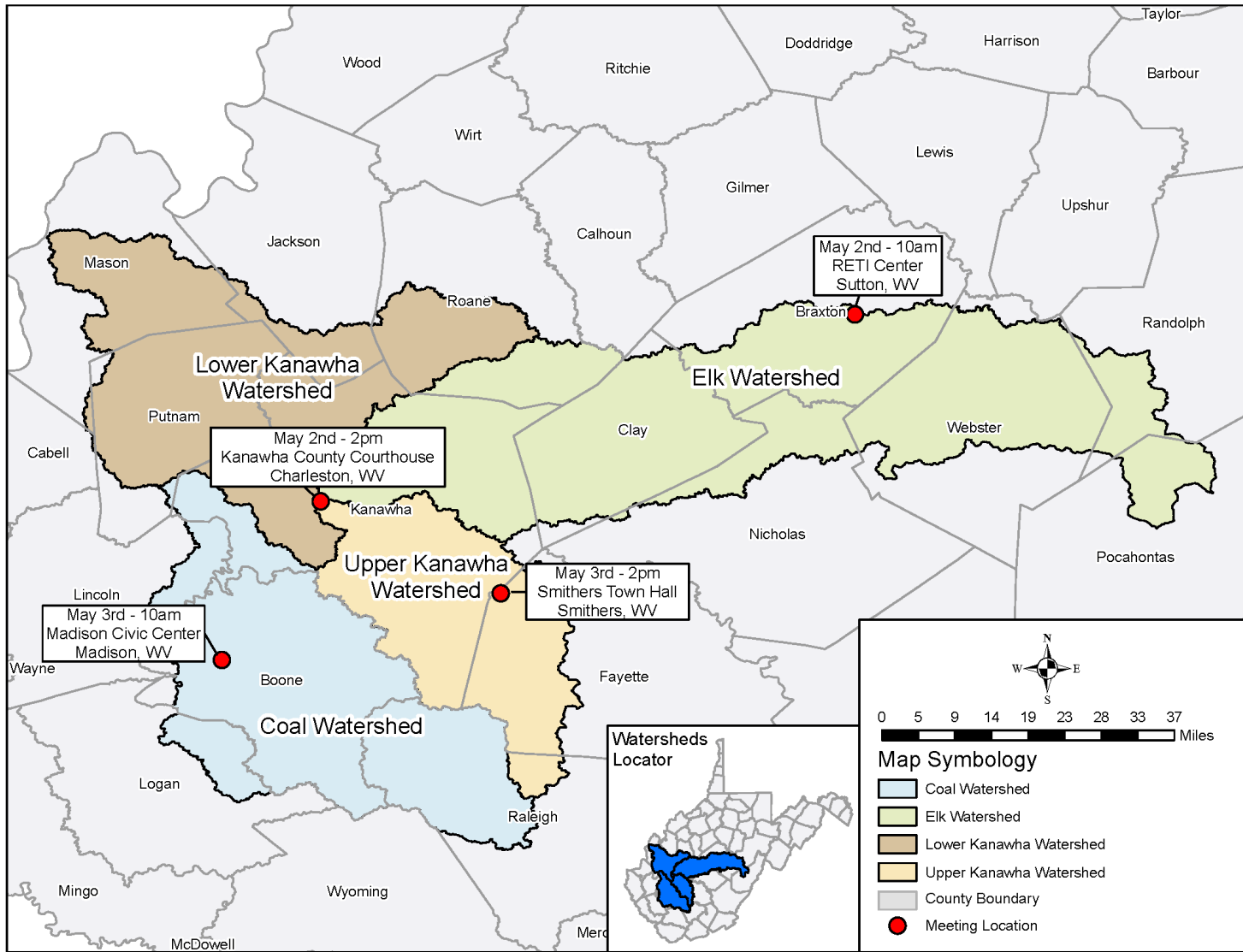
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Why Are We Here?

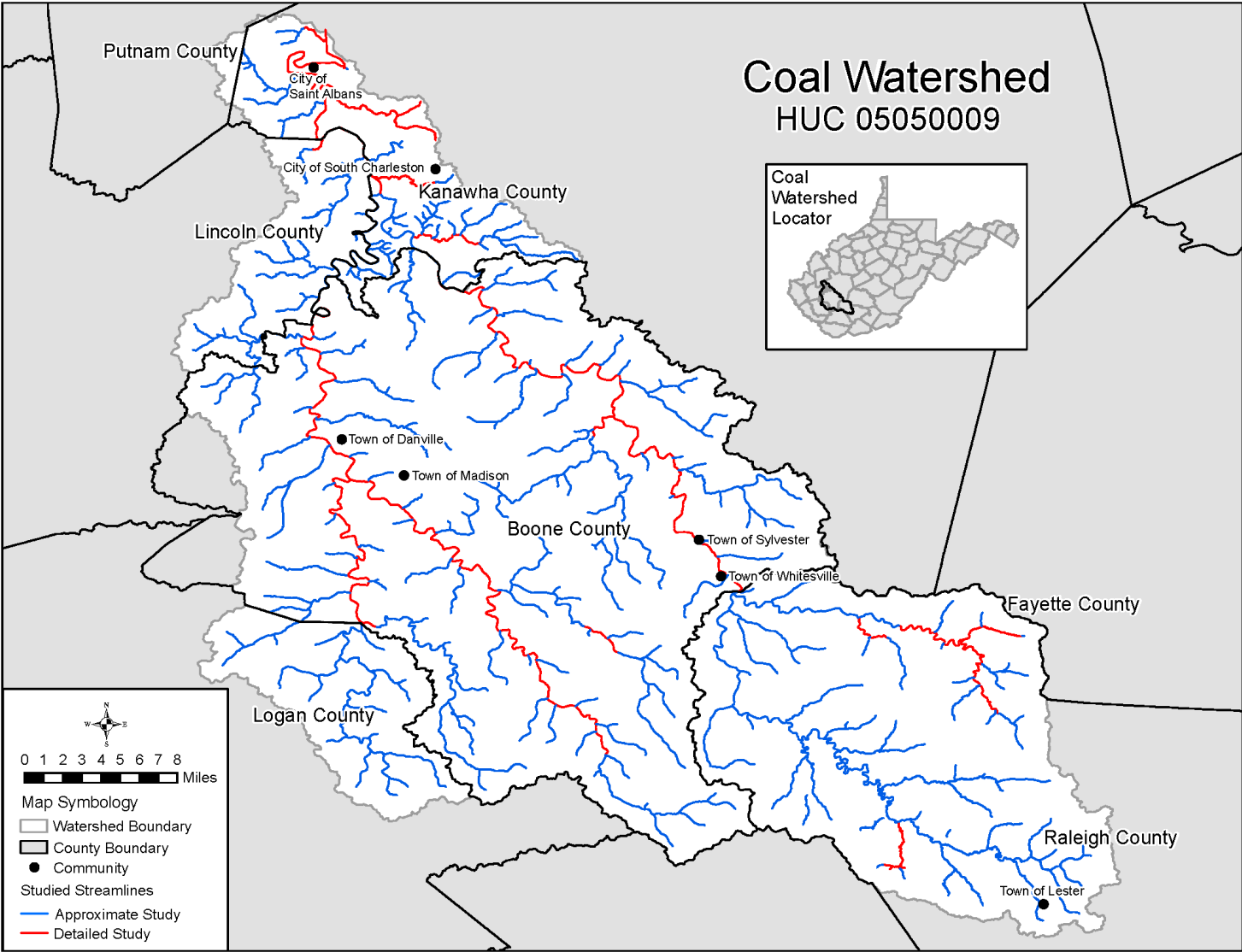
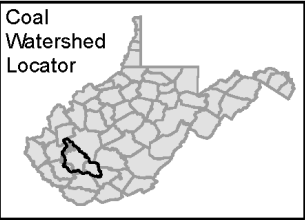
Through collaboration with State and local partners like yourselves, our goal is to deliver **quality flood hazard data** that helps you **increase public awareness** and **leads to action** that reduces risk to life and property.



FEMA



Coal Watershed HUC 05050009



0 1 2 3 4 5 6 7 8
Miles

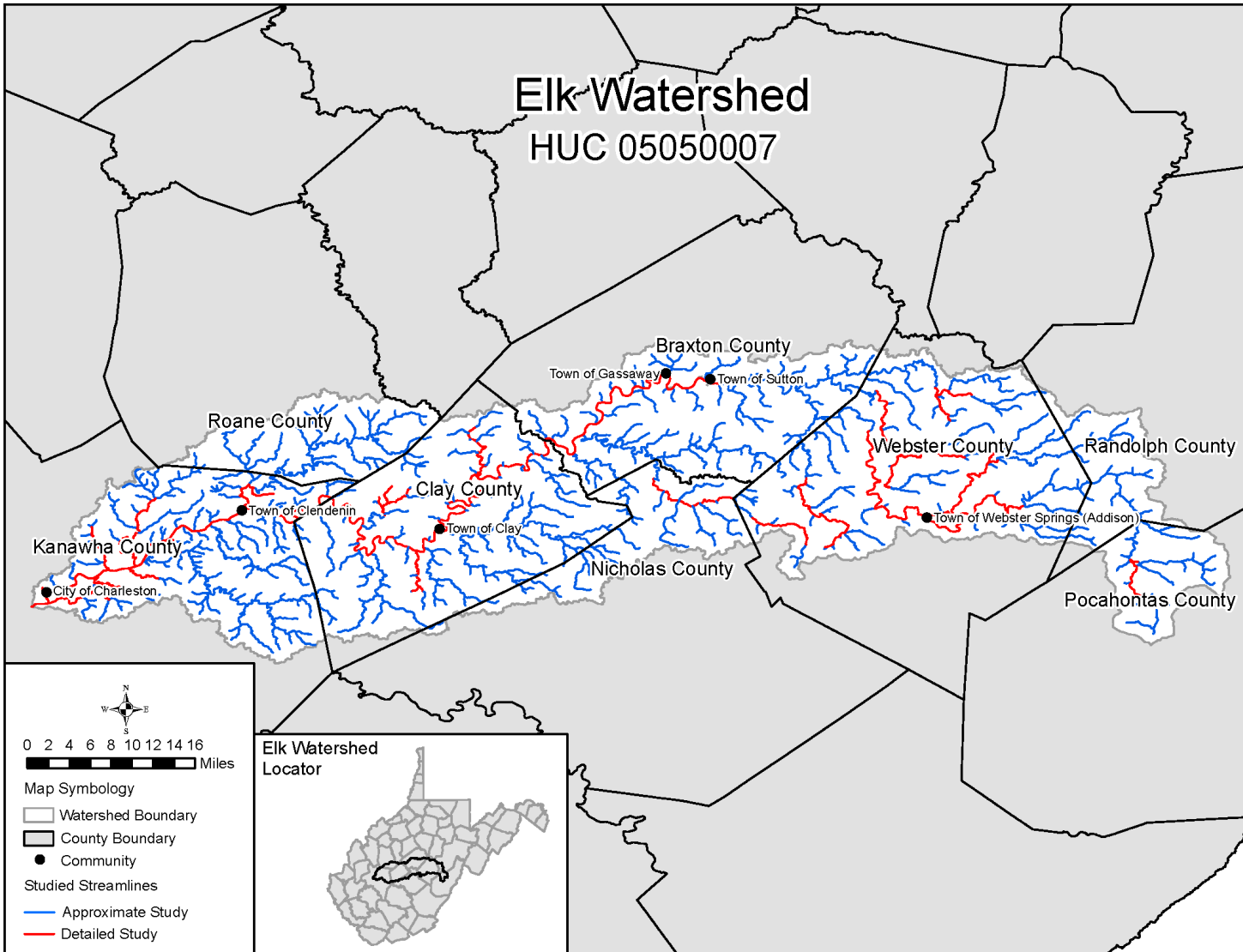
Map Symbology

- Watershed Boundary
- County Boundary
- Community

Studied Streamlines

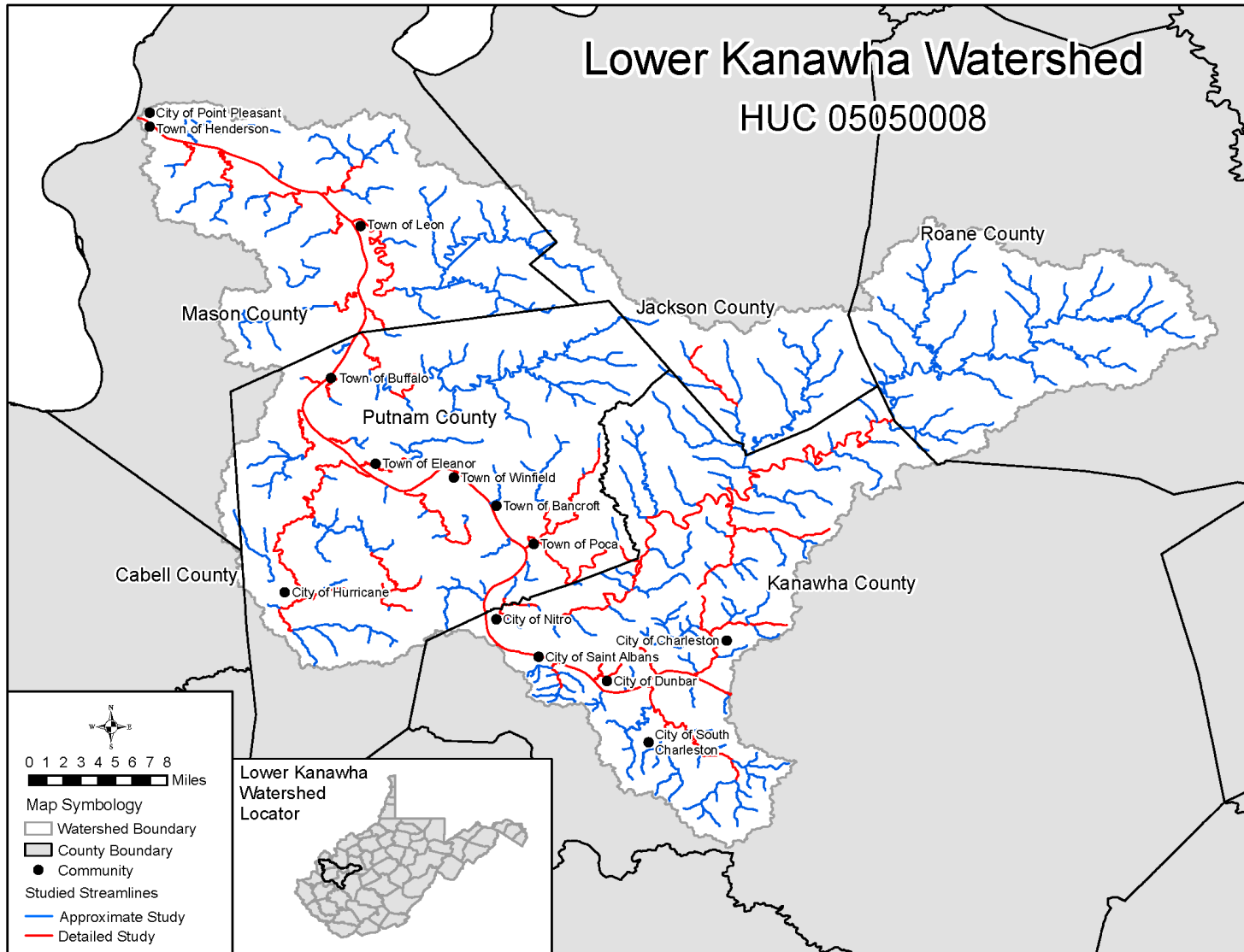
- Approximate Study
- Detailed Study

Elk Watershed HUC 05050007

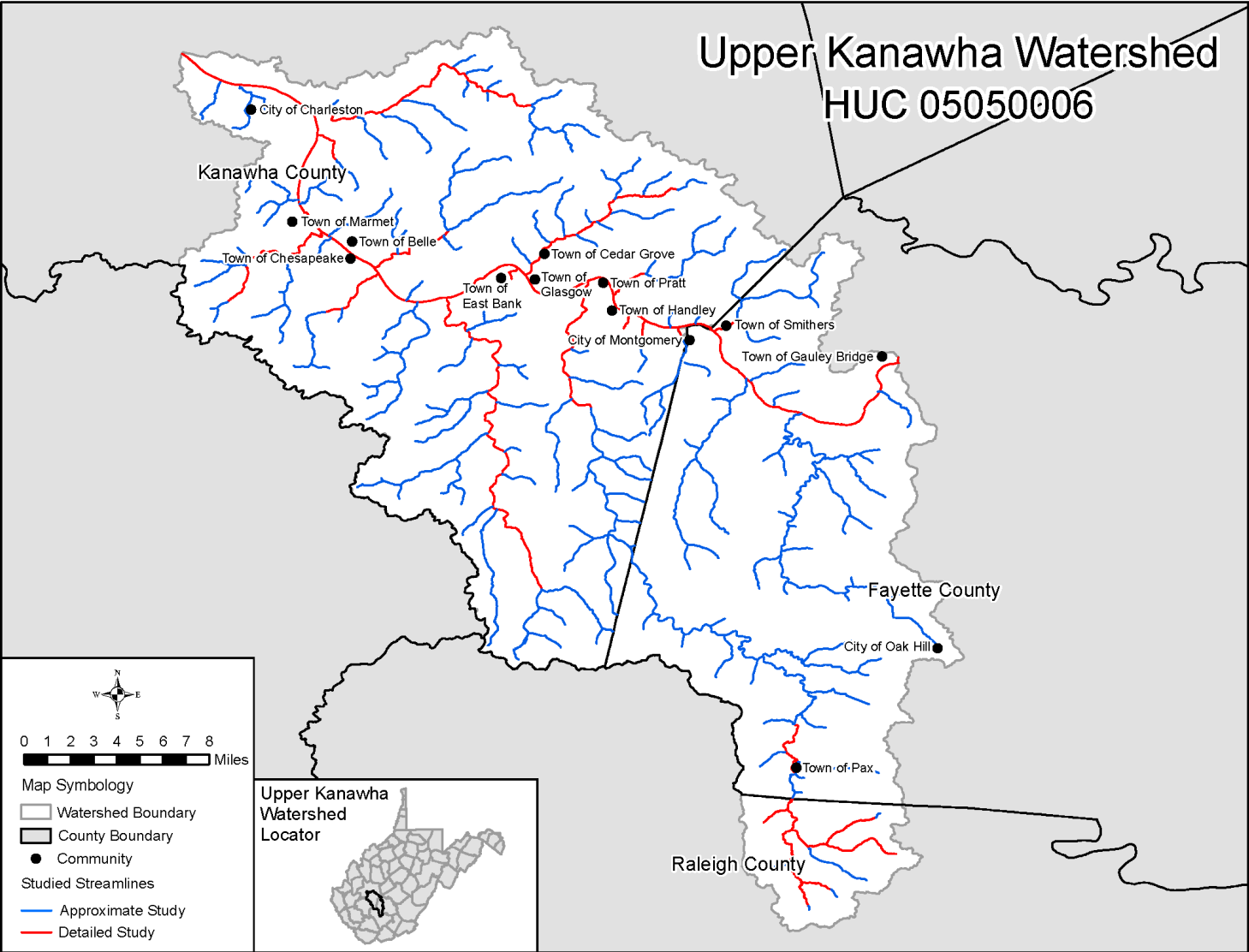


Lower Kanawha Watershed

HUC 05050008



Upper Kanawha Watershed HUC 05050006



Flood Insurance Rate Map (FIRM) Status

Jurisdiction	Effective FIRM Date	Jurisdiction	Effective FIRM Date
Town of Athens	3/2/2005	Monroe County (Unincorporated Areas)	6/17/2002
City of Bluefield	3/2/2005	Town of Oakvale	3/2/2005
Town of Bramwell	3/2/2005	Town of Peterstown	6/17/2002
City of Hinton	2/3/2010	City of Princeton	3/2/2005
Town of Matoaka	3/2/2005	Summers County (Unincorporated Areas)	2/3/2010
Mercer County (Unincorporated Areas)	3/2/2005	Town of Union	6/17/2002

Why Now? Better Data!

- Availability of High Resolution Elevation Data (LiDAR)
- Age of effective flood studies (non-coastal)
- New hydrologic calculations (30-40 more years of rainfall data)
- Affordable model-backed Zone A flood studies (HEC-RAS)
- Ability to provide new Flood Risk Products (depth grids, etc.)



FEMA

Discovery: Data Collection & Collaboration

- **Examples of data gathered and analyzed before the meeting include the following:**

- Watershed and Jurisdiction Boundaries
- Dams and Levees
- Stream Data
- Declared Disasters
- Effective Floodplains: Special Flood Hazard Areas
- Letters of Map Change
- NFIP Participation
- Individual and Public Assistance
- Mitigation Plan Status and Summary
- Population and Socioeconomic Characteristics



Flood Risk Data Questions

- **Data**

- What data do you already have available?
- What is your data wish list?

- **Technical Assistance**

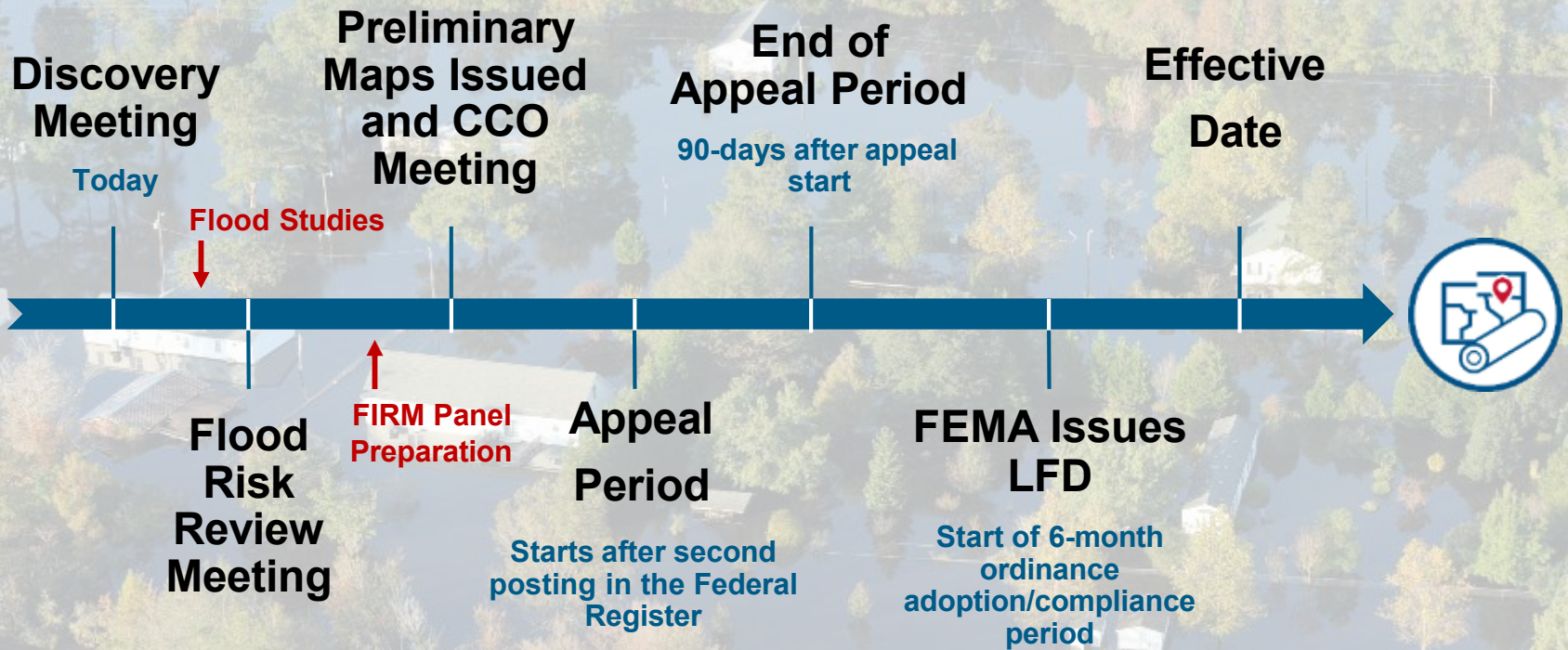
- What technical challenges are you facing, and what assistance could support your efforts right now?

- **Training and Outreach**

- What trainings and outreach would help support your existing or planned efforts?



Typical Flood Study Timeline



See Flood Study Process Banners around the room for a more detailed flood study update process description and timeline.



FEMA

RiskMAP

Discovery: Outcomes

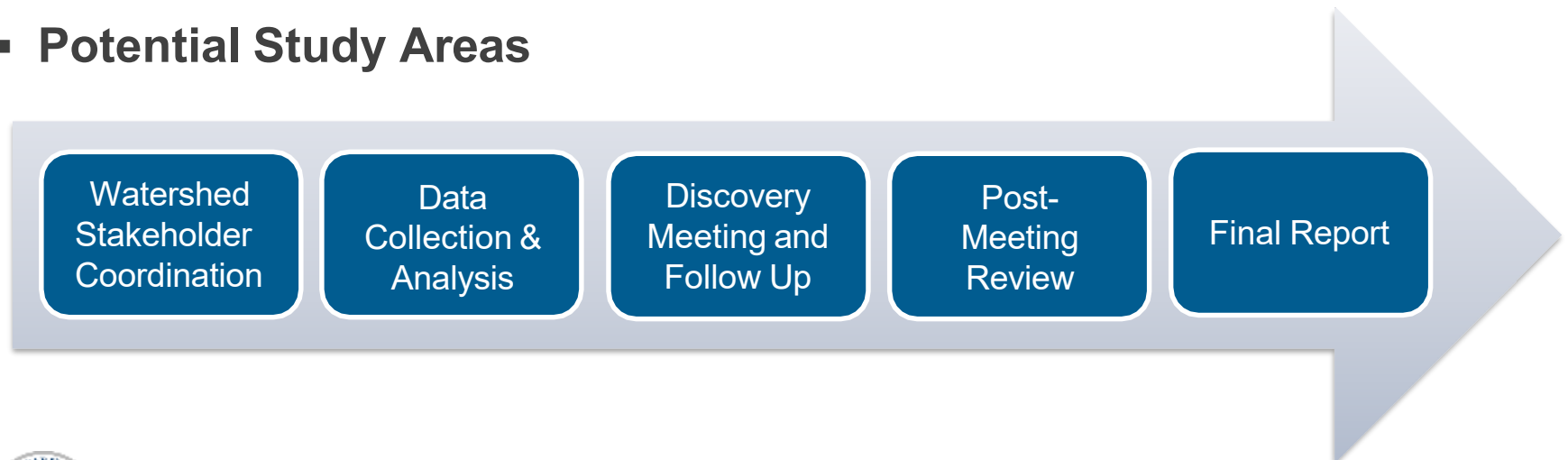
- **Discovery Report**

- Summary of data, analysis, meetings, and action items or decisions

- **Discovery Maps**

- Flood Hazards
- Potential Economic Loss
- Mapping Needs

- **Potential Study Areas**





Reducing Flood Risk in Communities



FEMA

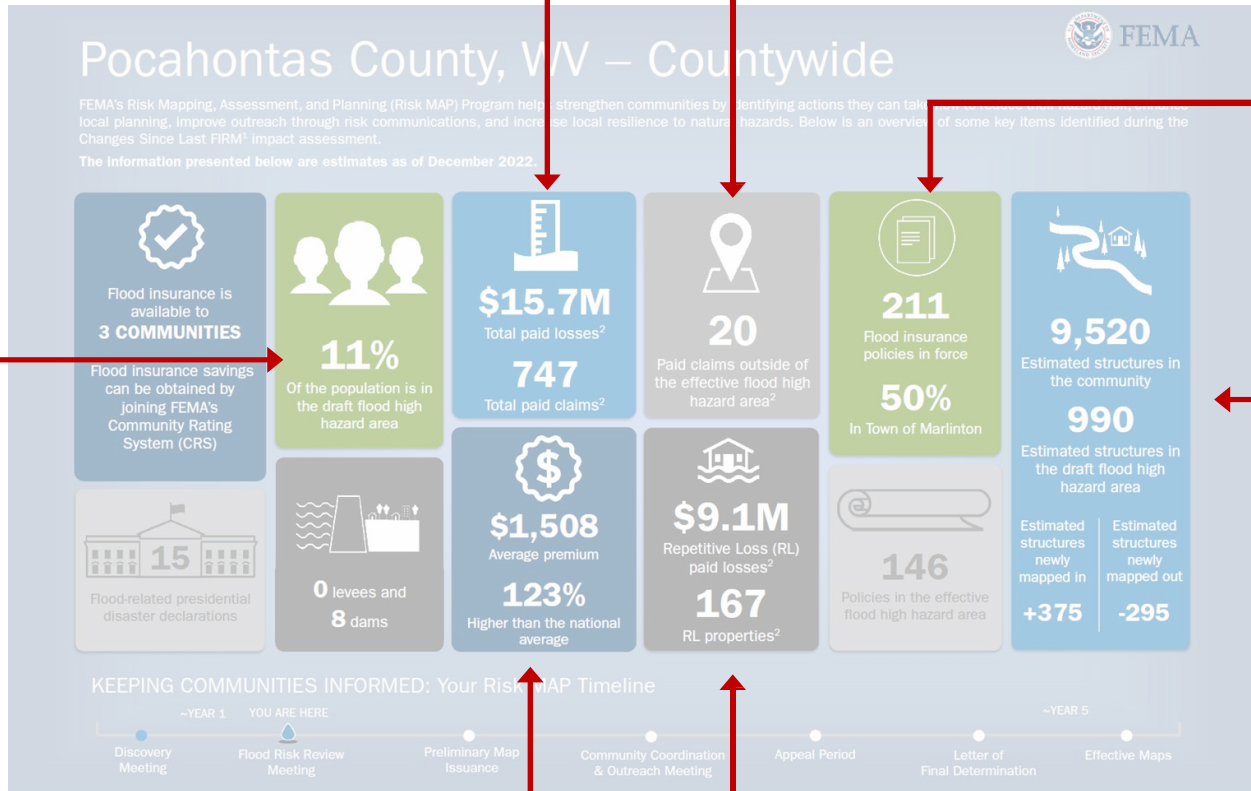
RiskMAP
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Flood Risk Dashboard

NFIP FLOOD CLAIM PAYOUTS

CLAIMS OUTSIDE OF SFHA

NFIP FLOOD POLICIES



AFFECTED RESIDENTS

HIGH-RISK STRUCTURES



FEMA

AVERAGE PREMIUM

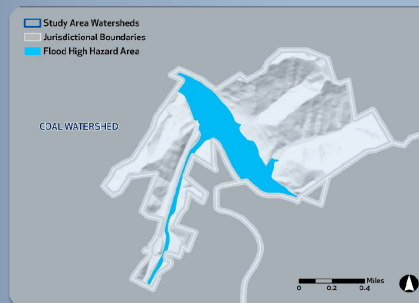
REPETITIVE LOSSES

Dashboard of Your Community Profile



Town of Danville/Boone County, WV

KNOW YOUR RISK (The information presented below are estimates as of August 2022.)



04/16/1991
Initial FIRM¹ date

05/16/2013
Effective FIRM date

\$749K
Total paid losses²

78
Total paid claims²

12
Flood insurance policies in force

11
Policies in the effective flood high hazard area

265
Estimated structures in the community

125
Estimated structures in the flood high hazard area

5
Letters of Map Change

25
Flood-related countywide presidential disaster declarations

7
Paid claims outside of the effective flood high hazard area²

\$459K
Repetitive Loss (RL) paid losses²

11
RL properties²

28%
of households spend 30% or more of their income on housing

47%
of the population is in the flood high hazard area

KEEPING COMMUNITIES INFORMED: Your Risk MAP Timeline








FEMA

How Can You Improve Your Community's Resilience to Flooding Now?



Hazard Mitigation Actions Save

National Benefit-Cost Ratio (BCR) Per Peril <i>*BCR numbers in this study have been rounded</i>		Beyond Code Requirements	Federally Funded
Overall Hazard Benefit-Cost Ratio		\$4:1	\$6:1
	Riverine Flood	\$5:1	\$7:1
	Hurricane Surge	\$7:1	Too few grants
	Wind	\$5:1	\$5:1
	Earthquake	\$4:1	\$3:1
	Wildland-Urban Interface Fire	\$4:1	\$3:1



Hazard Mitigation Plans

- **Hazard Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters**
 - Occurs before, during, and after disasters and serves to break the cycle of damage and repair
 - Long-term risk reduction
 - Essential part of community resilience



Local Mitigation Planning Handbook

March 2013



Next Steps



FEMA

RiskMAP
Increasing Resilience Together

Information We Need from You

- **Completed Discovery data questionnaire, with GIS contact**
- **Areas of Concern**
- **Areas of historical flooding and other flood risks**
- **Mitigation projects addressing flood risks**
- **Your ideas about ways to increase resilience**



FEMA

RiskMAP
Increasing Resilience Together

BUILDING-LEVEL RISK: 100-YEAR FLOOD

- Primary Structure (Future Map)
- LOMA Verified (In or Out SFHA)
- Building Exposure Cost
- Building Year Pre-FIRM & Post-FIRM
- Foundation Type
- Elevation Certificates (Building Type)
- Minus-Rated Structure
- Building Damage Loss Estimate

CRITICAL INFRASTRUCTURE

FLOOD DEPTH

OTHER NATURAL HAZARDS

MITIGATED PROPERTIES & OPEN SPACE

PRIMARY FLOOD HAZARD LAYERS

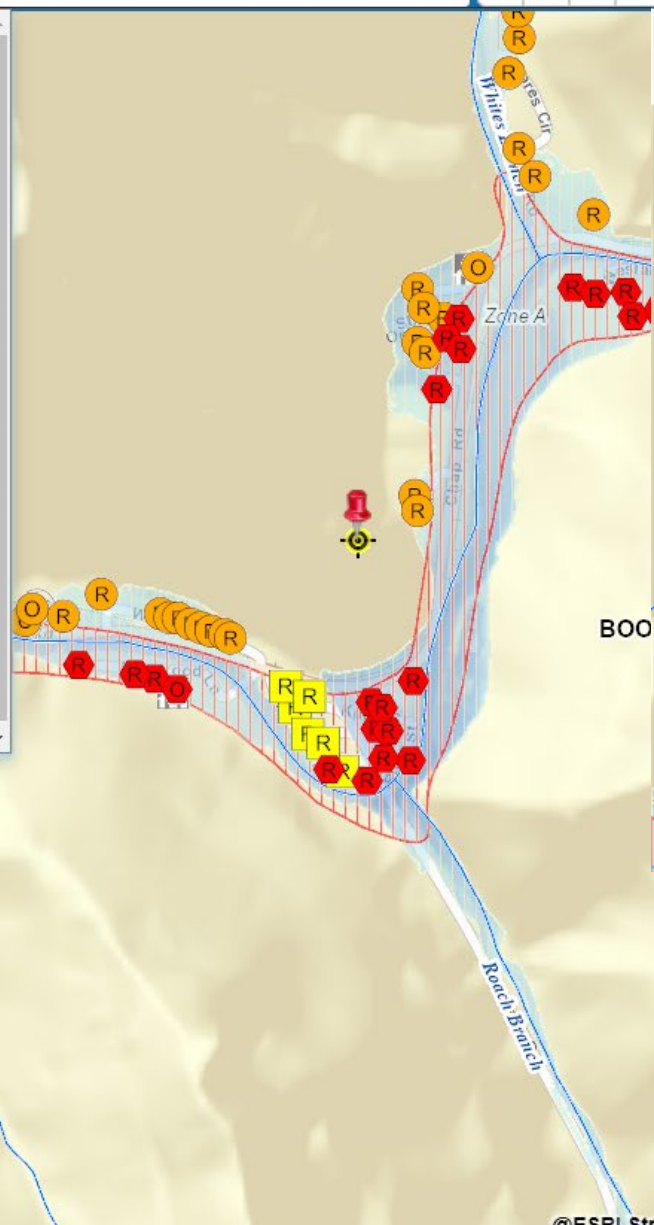
PRELIMINARY/DRAFT FLOOD LAYERS

OTHER FLOOD ZONE SYMBOLOGY

MISCELLANEOUS LAYERS

* Indicates that data is from FEMA

[Show Legend](#)



Flood Hazard Area: Location is NOT WITHIN any identified flood hazard area. Unmapped flood hazard areas may be present.

Flood Zone: Out of Flood Zone

Stream:

Watershed (HUC8): Coal (5050009)

FEMA's Flood Map: 54005C0280D [Download] [Download] NFHL

Map Effective Date: 5/16/2013

Contacts: Boone

Flood Height: N/A

Water Depth: N/A

HEC-RAS Model: N/A [Download] All Models

Flood Profile: N/A

Community: Boone County

Freeboard: 2 ft CRS Class: 10 CID: 540007

Location (lat, long): (37.973309, -81.702404) WGS84

Location (UTM 17N): (4203085, 438308) WGS84

External Viewers: [Icons]

Elevation: 1005.7 ft (Source: FEMA 2018-20) NAVD88

Address: [] : multiple addresses

Parcel: [] : 03-01-0018-0083-0000 | Assessment [Warning]

Flood Risk Information [Related Resources](#)

[Flood Risk Assessment](#)

[3D Flood Visualization](#) N/A

Project Contacts



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FEMA

RiskMAP
Increasing Resilience Together



FEMA

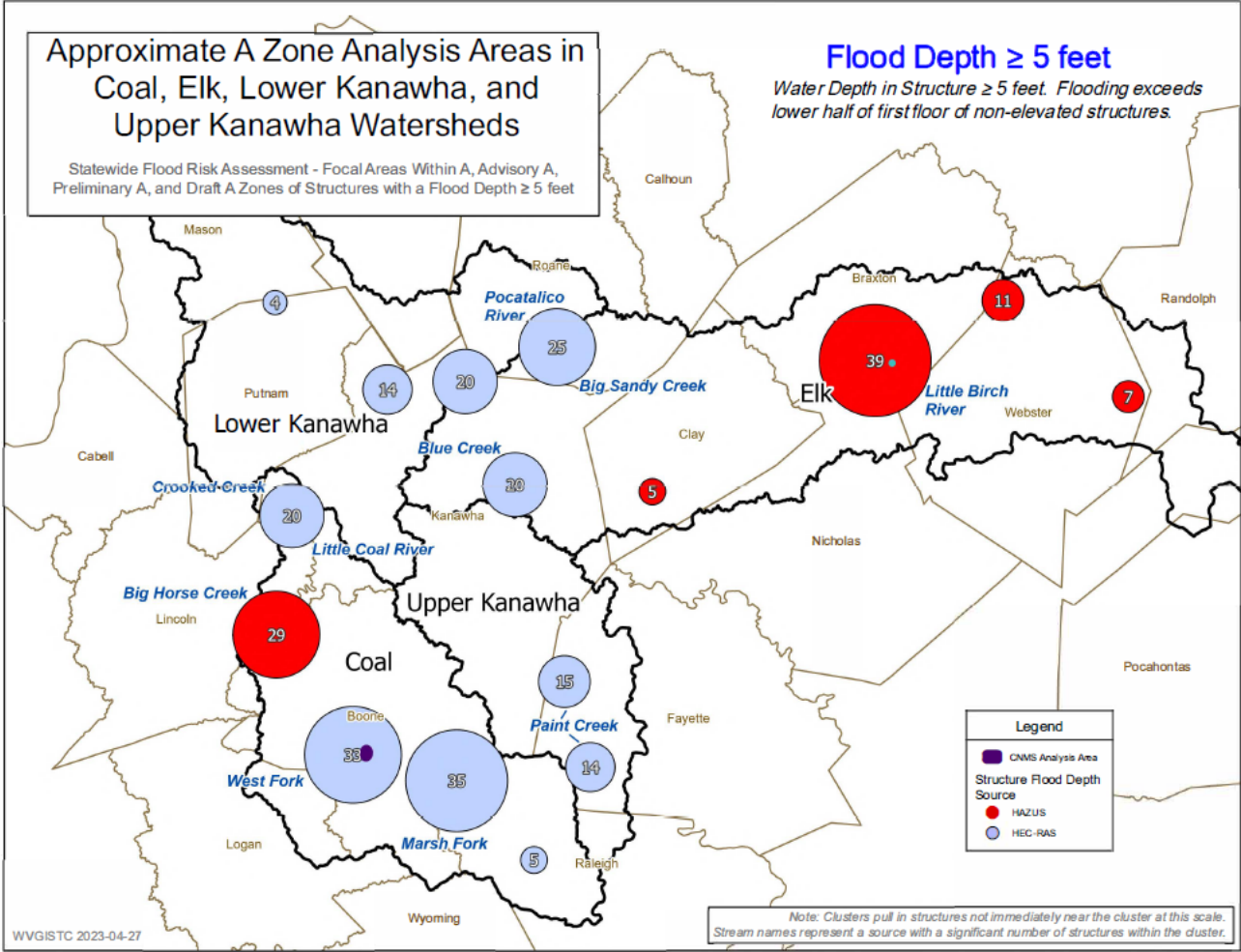


FEMA

APPENDIX J | WV GIS TECHNICAL CENTER

Zone A Building Cluster Analysis for Kanawha Basin Watersheds, WV

RANKING APPROXIMATE A ZONE STREAM REACHES FOR DETAILED ZONE AE MAPPING
WV GIS TECHNICAL CENTER, WEST VIRGINIA UNIVERSITY



Contents

Introduction	1
Depth Grids	1
12 Evaluation Factors for Zone A Building Cluster Analysis.....	2
WV Flood Tool’s Risk Map View.....	3
Findings & Rankings of Zone A Cluster Analysis – Kanawha Basin	4
Zone A Stream Candidates for Upgrading with Detailed Studies	4
Description of Factors to Consider Zone A Streams for Detailed Mapping Conversion.....	4
Listed Evaluation Factors of Priority Ranked Zone A Streams for Detailed Mapping.....	5
Summary Table of Zone A Cluster Analysis including Rankings.....	8
Graphics of Zone A Cluster Analysis.....	9
Summary Table/Graphics of Zone A Cluster Analysis including Rankings	10
Appendix A: Statewide Analysis - Zone A Structure Cluster Analysis	18
Appendix B: Differences in specifications & costs for AE and A Zones.....	21

Spatial Cluster Analysis of Structures in Approximate A Zones at 5 and 10-foot Flood Depths for Kanawha River Basin.

5/12/2023

Kurt Donaldson & Sara Lusher, WV GIS Technical Center, WVU

Introduction

Objective: This study evaluates potential Approximate A Zone rivers/streams in the **Kanawha River Basin** for more comprehensive Detailed Flood Studies for clusters of buildings with high flood damage potential. The Kanawha River Basin consists of four watersheds named after their primary rivers: Upper and Lower Kanawha, Coal, and Elk watersheds. A [statewide Approximate Zone A cluster analysis](#) with high flood depths was performed in February 2022 in which the **West Fork** of the Coal Watershed was added to the FEMA's Coordinated Needs Management Strategy (CNMS) geospatial database. This [Kanawha River Basin study](#) provides a more refined and detailed analysis for these four watersheds and identifies an additional five Zone A streams for detailed mapping consideration. The five additional streams are **Marsh Fork**, **Crooked Creek**, and **Big Horse Creek** of the Coal Watershed; **Pocatilico River** of the Lower Kanawha Watershed; and **Little Birch River** of the Elk Watershed.

Zone A Candidates for Detailed Studies. Twelve evaluation factors were utilized for ranking clusters of Approximate A Zone structures based on physical building, depth grid, and mapping cost factors. Using spatial cluster and building-level risk analyses, three streams in the **Coal Watershed – West Fork, Marsh Fork, and Crooked Creek** – ranked high per the evaluation factors to be restudied as Zone AE including minimal mapping cost. All these Zone A building clusters are adjacent to existing Zone AE streams. The next stream to be considered in the priority rankings should be the **Pocatilico River** where the Walton Elementary/Middle School is exposed to flooding. The final two Zone A streams to consider for upgrading to Zone AEs should be the **Big Horse Creek** and **Little Birch River**.

Depth Grids

Best Available Depth Grids: Where no model-backed HEC-RAS depth grids existed for Approximate A Zones, the less accurate 2010 Hazus depth grid was substituted. Refer to the [Advisory A Zone status graphic](#).

The Hazus depth grid created using FEMA's Hazus software may have anomalies and thus be less accurate; therefore, the depth grid type and its accuracy should be a factor in the Zone A conversion to Zone AE evaluation. Also note that the Zone A depth grids utilized in this study were developed most likely from a 3-meter DEM and hence not as accurate as the current, statewide LiDAR-derived 1-meter DEM.

12 Evaluation Factors for Zone A Building Cluster Analysis

Methodology and Rankings: A spatial cluster analysis of structures in Approximate A Zones was performed for flood depths of ≥ 5 feet and ≥ 10 feet using building-level risk assessment data from the TEIF/TEAL Statewide Risk Assessment project and the best available flood depth grids. A detailed analysis was conducted for building clusters of flood depths of ≥ 5 feet and ranked according to 12 evaluation factors (Figure 1). **Physical building factors** are based on (1) building counts, (2) building dollar exposure, (3) building damage dollar exposure estimates, (4) substantially damaged estimates, and (5) building types. **Depth grids factors** are (6) extreme flood depths ≥ 10 feet and (7) depth grid accuracy. **Mapping cost-effectiveness factors** are the (8) stream length of building clusters for Zone AE, (9) building density per square mile, (10) estimated Zone AE study cost per mile, (11) Zone A building cluster adjacent an existing Zone AE study, and (12) legacy county boundary mapping issues. The twelve evaluations factors listed below were utilized for ranking clusters of Approximate A Zone structures as candidates for Zone AE Detailed Flood Studies. Refer to Table 3 that lists Zone A stream candidates for Zone AE mapping with seven of the evaluation factors.

Figure 1. Evaluation Factors

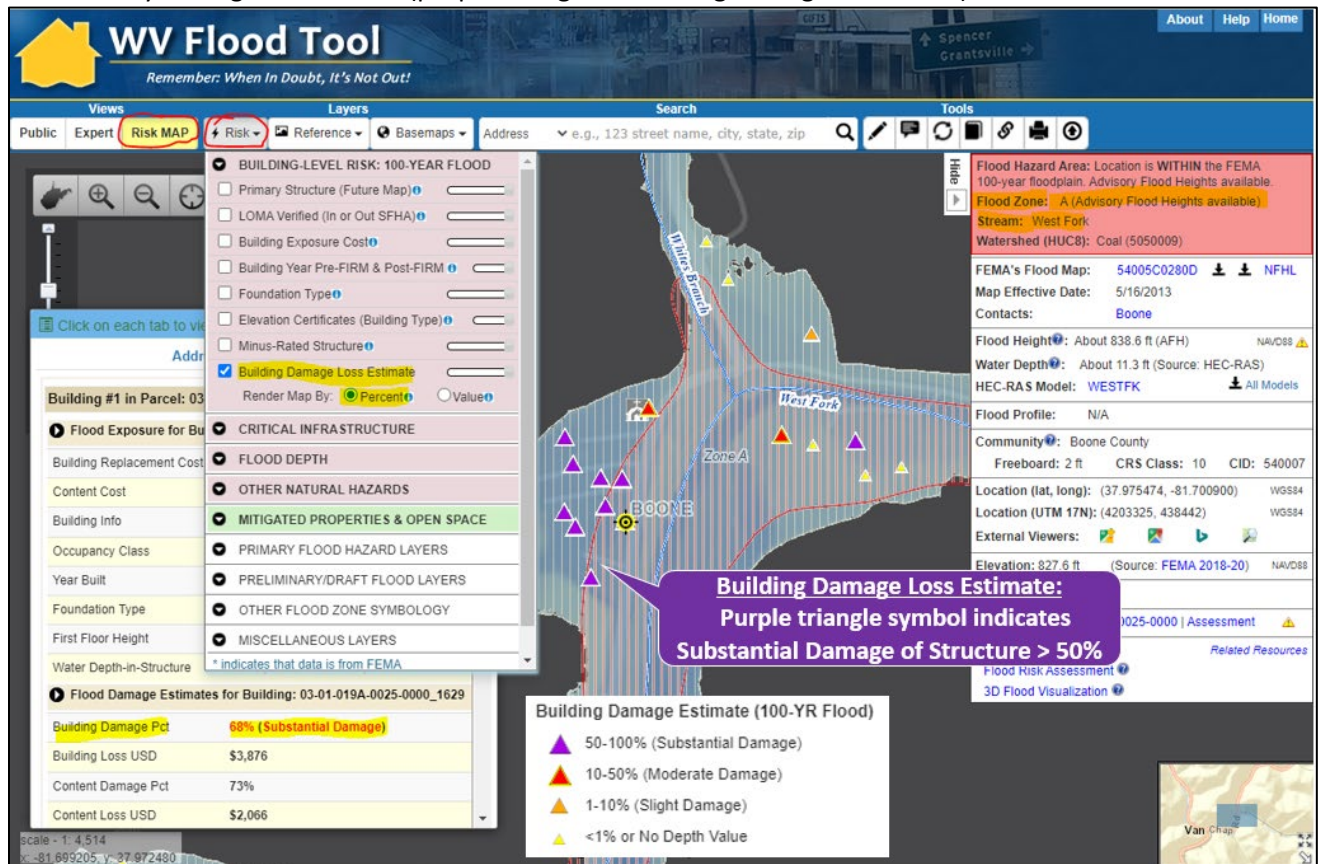
12 Evaluation Factors for Ranking Zone A Building Clusters with High Flood Depths

- **Physical Building Factors: Type, Exposure, & Damage**
 - 1) Building Count
 - 2) Building Dollar (\$) Exposure
 - 3) Building Damage Dollar (\$) Loss Estimates
 - 4) Substantially Damaged Loss (%) Estimates
 - 5) Building Types
 - Residential versus Non-Residential
 - Essential facilities and Community Assets
- **Depth Grids Factors: Extreme Flood Depths, Depth Grid Accuracy**
 - 6) Extreme flood depths of structures ≥ 10 feet (verify not flood study error)
 - 7) Depth Grid Accuracy
 - Model-backed HEC-RAS depth grid (more accurate)
 - 2010 Hazus depth grid (less accurate)
- **Mapping Cost Effectiveness Factors**
 - 8) Stream length of building clusters for Zone AE conversion
 - 9) Building density per square mile (Building Count / Cluster Stream Length)
 - 10) Estimated Zone AE study cost per mile (\$2,500 per mile)
 - 11) Zone A building cluster adjacent to existing Zone AE
 - 12) Legacy county boundary mapping issue (Zone AE mapping stopped at county border)

WV Flood Tool's Risk Map View

WV Flood Tool's Risk MAP View – Building Damage Loss Estimate Percent Layer: In the Risk MAP View of the WV Flood Tool, the risk assessment layer, **Building Damage Loss Estimate (%)**, provides a relationship between high flood depths and flood loss estimates of substantially damaged buildings (> 50% damage) for a 1% annual chance flood (Figure 2). High building-level damage percentages typically correlate to structures in Approximate A Zones with high base flood depths. The graphical view of the Building Damage Loss Estimates map layer of the WV Flood Tool's RiskMAP View helps one to visually confirm the spatial cluster analysis and tabular building loss estimates.

Figure 2. WV Flood Tool's RiskMAP View showing correlation between high flood depths and substantially damaged structures (purple triangles – building damage loss > 50%) for a 1% flood event



Findings & Rankings of Zone A Cluster Analysis – Kanawha Basin

Zone A Stream Candidates for Upgrading with Detailed Studies

Using spatial cluster and building-level risk analyses, below is a list of Approximate A Zones with map links to the WV Flood Tool to consider upgrading for detailed flood studies. The **boldfaced streams** (Crooked Creek, Marsh Fork, West Fork), all in the Coal Watershed, rank high on the evaluation factors and can be restudied as Zone AE at a minimal mapping cost.

Table 2. Priority Ranked Zone A Streams for Upgrading to Zone AE

- TOP RANKING – FIRST TIER
 - **West Fork** (Coal Watershed)
 - **Marsh Fork** (Coal Watershed)
 - **Crooked Creek & Crook Creek Tributary No.2** (Coal Watershed)
- MEDIUM RANKING – SECOND TIER
 - Pocatatico River (Lower Kanawha Watershed)
- LOWER RANKING – THIRD TIER
 - Big Horse Creek (Coal Watershed)
 - Little Birch River (Elk Watershed)

Description of Factors to Consider Zone A Streams for Detailed Mapping Conversion

West Fork: The West Fork of the Coal Watershed has the highest cluster number of structures greater \geq 10 ft. flood depth (n=12) and the highest estimated number of substantially damaged structures (n=20) for a 1%-annual-chance flood event. Typically, high flood depths correlate to high building damage loss estimates. The West Fork also has the highest density of structures of 22.1 buildings per square mile and low Zone AE mapping cost. First Baptist Church, a community asset, is located in this Zone A building cluster.

Marsh Fork: The Marsh Fork building cluster has the highest number of structures \geq 5-foot flood depth. Flood study mapping issues defined by the Raleigh-Boone county boundary border resulted in mapping Boone County as Zone AE and Raleigh County as Zone A. An essential facility, the WV State Police Troop 6 (Whitesville Detachment), is located within this Zone A building cluster. Four structures of significance – two essential facilities and two community assets – are located in the building cluster.

Crooked Creek: A small Zone AE mapping extension along Crooked Creek and Crooked Creek Tributary and lowest mapping cost of \$1,275 (\$2,300 mapping cost per Zone AE mile) should be considered. Almost all five structures in this building cluster are \geq 10-foot flood depth. This creek has the lowest estimated Zone AE mapping cost of \$1,275. Backwater flooding from Coal River may be a factor for high flood depths.

Pocatatico River: The building cluster along this river has the highest building dollar exposure of \$6.7M and damage loss estimate of \$867K, primarily because the high-value [Walton Elementary/Middle School](#)

is located in a 1%-annual chance floodplain with building cluster flood depths ≥ 5 feet. The school's building footprint edge closest to the flood source is nearly 8 feet. A negative factor may be that the cluster of Zone A structures is not adjacent to an existing Zone AE.

Big Horse Creek: This building cluster follows a longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. The estimated Zone AE mapping cost is \$13,750. No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County; consequently, the less accurate Hazus flood depth grid available for building-level risk assessment cluster analysis.

Little Birch River: A high cluster number of structures ≥ 5 -foot flood depth ($n=28$) with a building dollar exposure of 1.6 million exists along Little Birch Run. This Zone A building cluster is not adjacent to existing Zone AE and is based on less accurate Hazus flood depth grid. In addition, this Zone A stream candidate for detailed mapping has the most scattered building cluster spread over 6.0 miles.

Listed Evaluation Factors of Priority Ranked Zone A Streams for Detailed Mapping

West Fork, Coal Watershed, Boone County

- High cluster number of structures ≥ 5 ft. flood depth ($n=21$)
- High building dollar exposure of \$682K (if don't include Walton School on Pocatlico River)
- **Highest number of structures ≥ 10 ft. flood depth ($n=12$). More than double the number of structures of any other Zone A stream reach candidates for detailed mapping.** Engineering flood models of extreme flood depths should be verified.
- **Highest number of and substantially damaged structures ($n= 20$) for a 1%-annual-chance flood event.** High building damage dollar loss estimate (\$460K).
- **Highest density of structures of 22.1 buildings per square mile.**
- **Small Zone AE mapping distance less than 1 mile for building cluster**
- **Low estimated Zone AE mapping cost of \$2,375 (less than \$5,000)**
- Adjacent to existing Zone AE
- Model-backed flood depth grid
- Already incorporated into CNMS database from statewide analysis in February 2022
- Community asset, First Baptist Church, located in Zone A building cluster.

Marsh Fork, Coal Watershed, Raleigh County (border mapping issue)

- **Highest cluster number of structures ≥ 5 ft. flood depth ($n=31$)**
- High building dollar exposure of \$1.45 million
- High density of structures of 14.1 buildings per square mile.
- High ranked stream for building damage dollar loss (\$415K) and substantially damaged structures ($n= 17$) for a 1%-annual-chance flood event.
- **Essential facility WV State Police Troop 6 (Whitesville Detachment) is located within this Zone A building cluster. Another essential facility, the Whitesville Volunteer Fire Department (Pettus Substation), is also located in the high-risk Advisory Zone A of the building cluster.**
- **Two community assets, Pettus Baptist Church and New Life Assembly Church, are also in the building cluster located on Coal River Road (State Route 3) south of Whitesville.**
- Zone AE mapping distance less than 2.2 mile for building cluster

- Estimated Zone AE mapping cost of \$5,500
- Adjacent to existing Zone AE
- Model-backed flood depth grid
- **Legacy Raleigh-Boone county boundary mapping issue in which Boone County has Zone AE and Raleigh County Zone A.**

[Crooked Creek & Crooked Creek Tributary, Coal Watershed, Kanawha County](#)

- Cluster number of structures ≥ 5 ft. flood depth (n=6)
- **Almost all structures in cluster ≥ 10 ft. flood depth (n=5).**
- Building dollar exposure of \$350K
- High density of structures of 11.1 buildings per square mile.
- High ranked stream for building damage dollar loss (\$250K) and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.
- **Smallest Zone AE mapping distance less than 0.51 miles for building cluster**
- **Lowest estimated Zone AE mapping cost of \$1,275 (less than \$5,000)**
- Adjacent to existing Zone AE
- Model-backed flood depth grid

[Pocatalico River, Lower Kanawha Watershed, Roane County](#)

- Cluster number of structures ≥ 5 ft. flood depth (n=13)
- **Highest building dollar exposure of \$6.7 million since it includes [Walton Elementary/Middle School](#) valued at \$6.1 million.**
- Density of structures of 4.0 buildings per square mile.
- **Highest ranked stream for building damage dollar loss (\$867K) and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.**
- **Essential facility: Walton Elementary/Middle School, Pre-FIRM building, building value \$6.1 million, flood depth higher than nearly 8 feet for school's building footprint edge closest to flood source. Estimated building loss \$551K or higher for a 1% flood event.**
- Zone AE mapping distance 3.28 miles for building cluster
- Estimated Zone AE mapping cost of \$8,200
- **NOT Adjacent** to existing Zone AE
- Model-backed flood depth grid

Big Horse Creek, Coal Watershed, Boone County

- Cluster number of structures \geq 5 ft. flood depth (n=15)
- Building dollar exposure of \$778K
- Density of structures of 3.6 buildings per square mile.
- Two churches (community assets) are part of building cluster.
- High ranked stream for building damage dollar loss (\$250K) and substantially damaged structures (n= 7) for a 1%-annual-chance flood event.
- **A longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. Estimated Zone AE mapping cost of \$13,750.**
- **No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County; therefore, the less accurate Hazus flood depth grid is utilized for the Zone A building cluster analysis.**

Little Birch River, Elk Watershed, Braxton County

- **High cluster number of structures \geq 5 ft. flood depth (n=28)**
- High Building dollar exposure of \$1.6M
- Density of structures of 4.7 buildings per square mile.
- High ranked stream for building damage dollar loss (\$683,020) and substantially damaged structures (n= 14) for a 1%-annual-chance flood event.
- Zone AE mapping distance less than 4.7 miles for building cluster
- Estimated Zone AE mapping cost of \$14,975
- **Longest building cluster stream reach of 6.0 miles.**
- **NOT Adjacent** to existing Zone AE
- **Hazus flood depth grid (less accurate) because no model-backed depth grids or Advisory Flood Heights exist.**

Boldfaced Text: Highlighted evaluation factors of Zone A building cluster analysis

Red Text: Potential negative evaluation factors for Zone A building cluster analysis.

Summary Table of Zone A Cluster Analysis including Rankings

Table 3. Summary table of ranked Zone A cluster analysis rivers/streams according to building-level loss estimates.

Rank	1	2	3	4	5	6
BUILDING COUNT	<i>Marsh Fork</i>	<i>Little Birch River</i>	<i>West Fork</i>	<i>Big Horse Creek</i>	<i>Paint Creek</i>	<i>Blue Creek</i>
	31	28	21	20	18	17
BUILDING DOLLAR EXPOSURE	<i>Pocatalico River</i>	<i>Little Birch River</i>	<i>Marsh Fork</i>	<i>Elk River</i>	<i>Big Horse Creek</i>	<i>West Fork</i>
	\$6.74M	\$1.61M	\$1.45M	\$1.18M	\$778K	\$682K
BUILDING DAMAGE LOSS	<i>Pocatalico River</i>	<i>Little Birch River</i>	<i>West Fork</i>	<i>Marsh Fork</i>	<i>Big Horse Creek</i>	<i>Blue Creek</i>
	\$867K	\$683K	\$460K	\$415K	\$264K	\$238K
DAMAGE ≥ 50%	<i>West Fork</i>	<i>Marsh Fork</i>	<i>Little Birch River</i>	<i>Pocatalico River*</i>	<i>Big Horse Creek*</i>	<i>Blue Creek</i>
	20	17	14	7	7	7
BUILDING DENISTY per mile	<i>West Fork</i>	<i>Marsh Fork</i>	<i>Crooked Creek</i>	<i>Little Birch River</i>	<i>Pocatalico River</i>	<i>Big Horse Creek</i>
	22.1	14.1	11.5	4.7	4.0	3.6
Zone AE Cost per mile	<i>Crooked Creek</i>	<i>West Fork</i>	<i>Marsh Fork</i>	<i>Pocatalico River</i>	<i>Big Horse Creek</i>	<i>Little Birch River</i>
	\$634	\$2,375	\$5,500	\$8,200	\$13,750	\$14,975

**Pocatalico River, Big Horse Creek, Blue Creek, and Paint Creek all have 7 structures with damage ≥ 50%*
 Red stream names indicate less accurate HAZUS depth grids

Graphics of Zone A Cluster Analysis

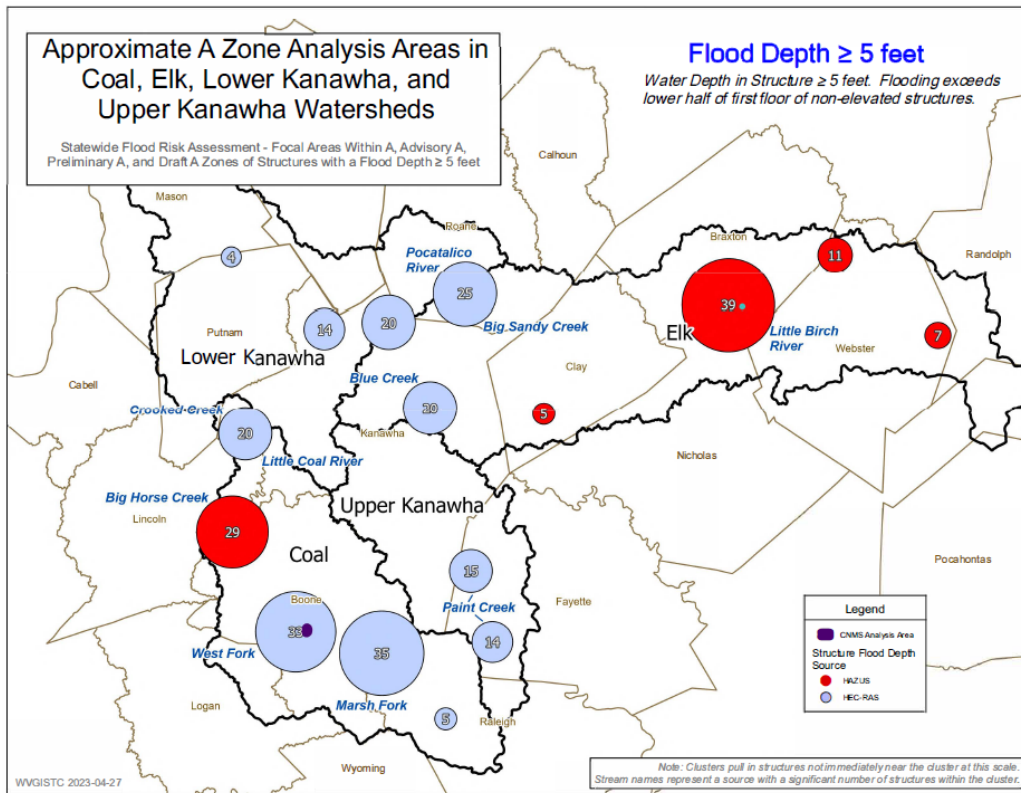


Figure 2. Building Cluster Zone A Analysis for Flood Depth ≥ 5 feet

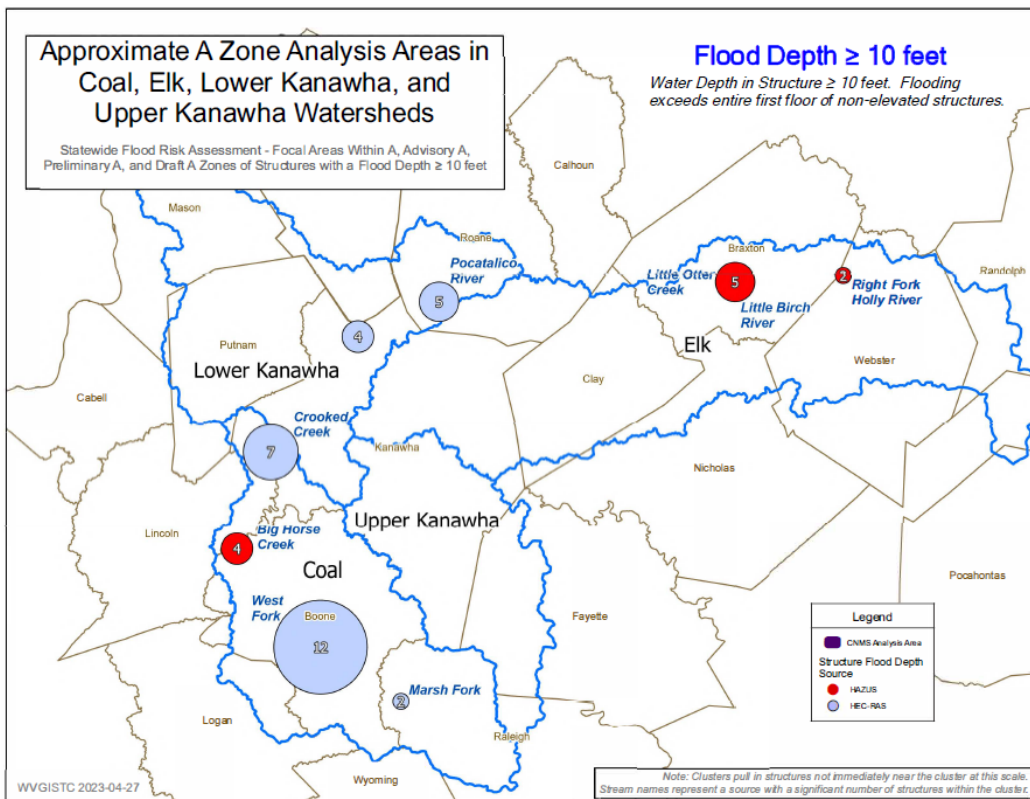


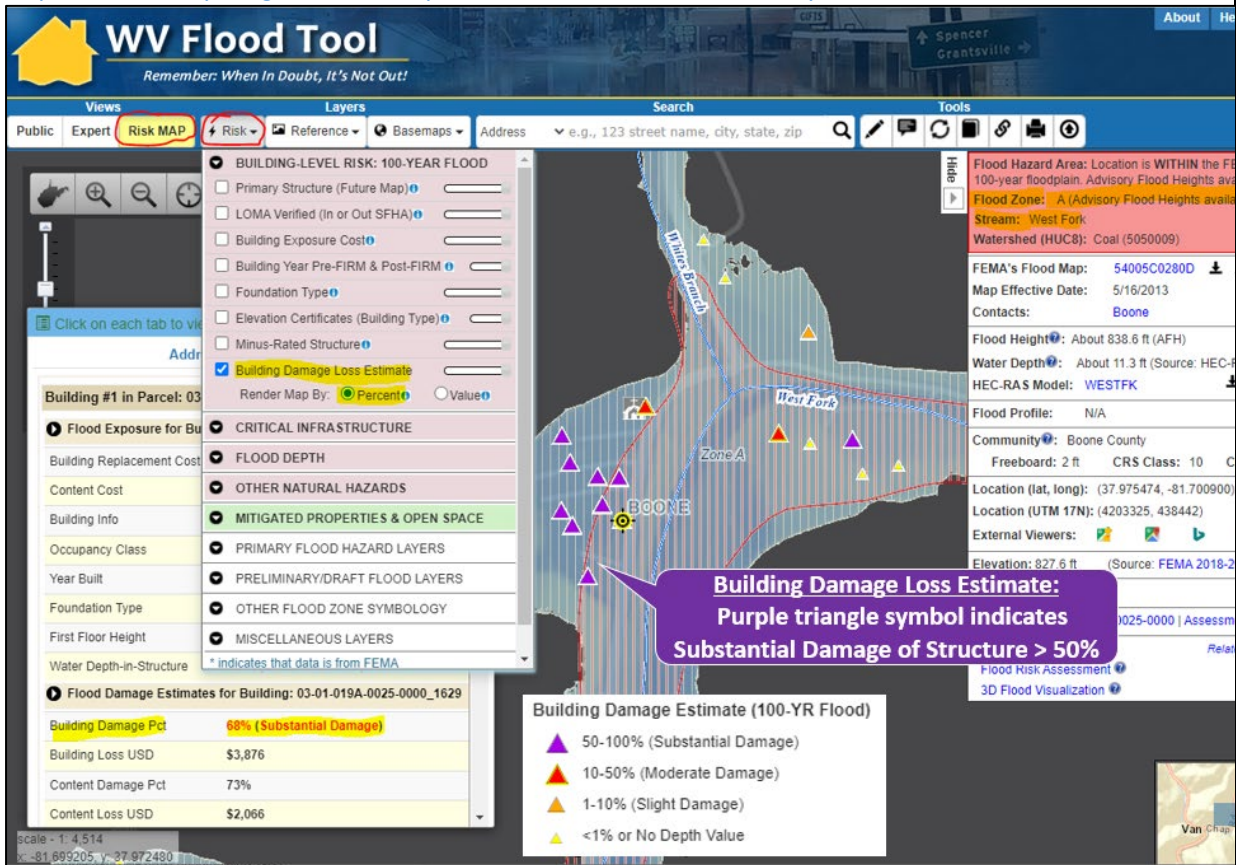
Figure 3. Building Cluster Zone A Analysis for Flood Depth ≥ 10 feet

Summary Table/Graphics of Zone A Cluster Analysis including Rankings

West Fork, Coal Watershed, Boone County

West Fork: The West Fork of the Coal Watershed has the highest cluster number of structures greater ≥ 10 ft. flood depth (n=12) and the highest estimated number of substantially damaged structures (n=20) for a 1%-annual-chance flood event. Typically, high flood depths correlate to high building damage loss estimates. The West Fork also has the highest density of structures of 22.1 buildings per square mile and low Zone AE mapping cost. First Baptist Church, a community asset, located in Zone A building cluster.

<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9094825&y=4575656&l=9&v=2>



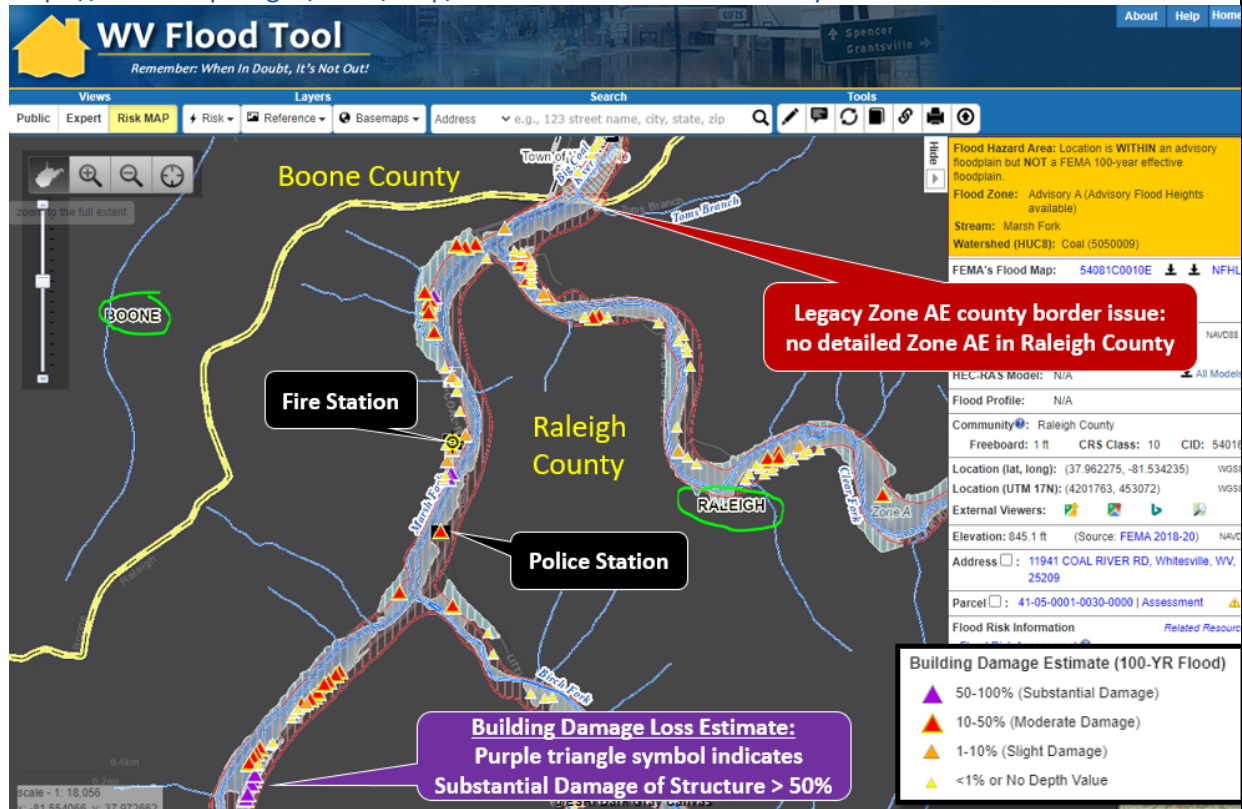
Building Damage Estimate (100-YR Flood)

- 50-100% (Substantial Damage)
- 10-50% (Moderate Damage)
- 1-10% (Slight Damage)
- <1% or No Depth Value

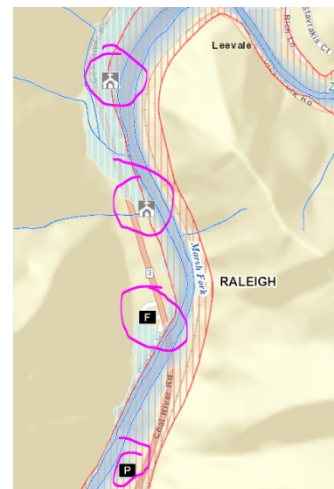
Marsh Fork, Coal Watershed, Raleigh County (border mapping issue)

Marsh Fork: The Marsh Fork has the highest number of structures ≥ 5 ft. flood depth. Legacy Raleigh-Boone county boundary mapping issue defined by county boundary mapping in which Boone County has Zone AE and Raleigh County Zone A. Essential facility WV State Police Troop 6 (Whitesville Detachment) is located within this Zone A building cluster. Another essential facility, the Whitesville Volunteer Fire Department (Pettus Substation), is also located in the high-risk Advisory Zone A of the building cluster. Two community assets, Pettus Baptist Church and New Life Assembly Church, are also in the building cluster located on Coal River Road (State Route 3) south of Whitesville.

<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9076356&y=4573933&l=8&v=2>



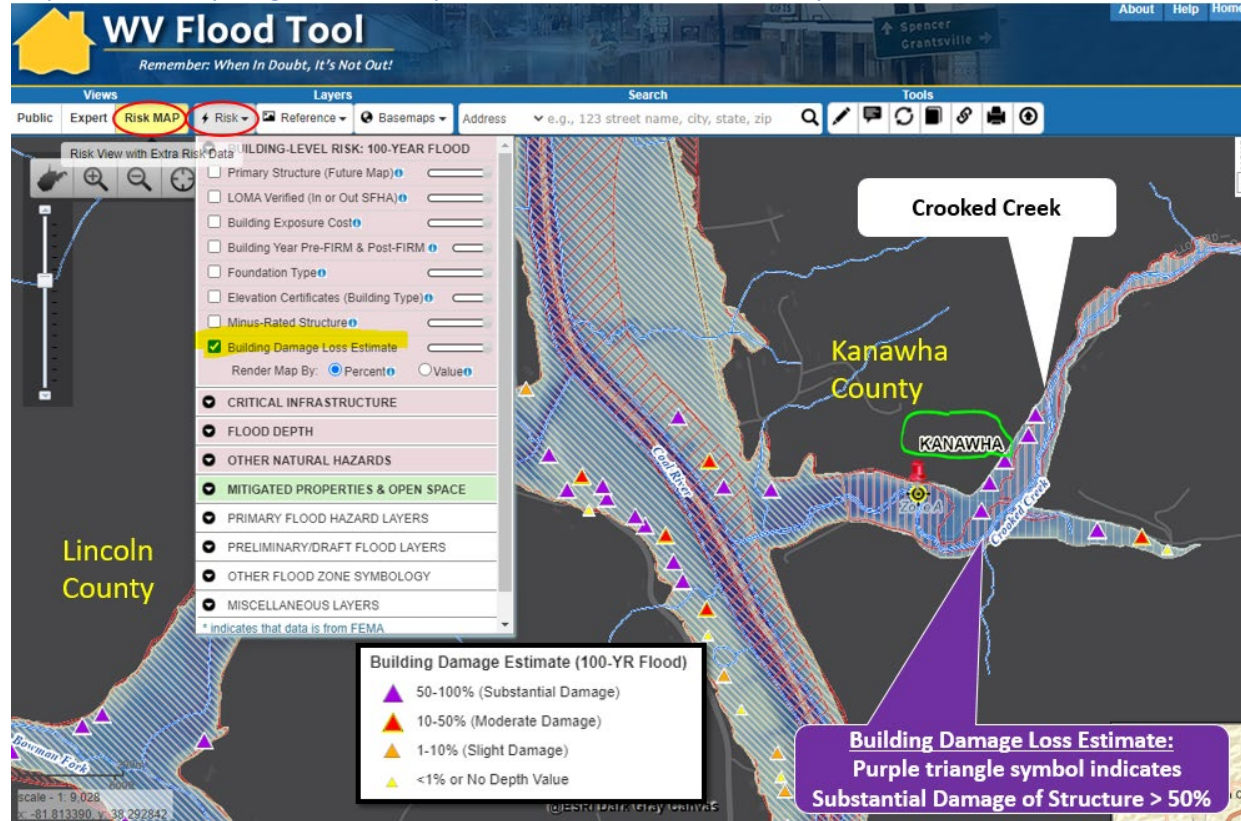
Four structures of significance - two essential facilities and two community assets - are located in the building cluster.



Crooked Creek & Crooked Creek Tributary, Coal Watershed, Kanawha County

Crooked Creek: Small Zone AE mapping extension along Crooked Creek and Crooked Creek Tributary and lowest mapping cost of \$1,275 (\$2,300 mapping cost per Zone AE mile). Almost all five structures in cluster ≥ 10 ft. flood depth. Lowest estimated Zone AE mapping cost of \$1,275. Backwater from Coal River may be a factor.

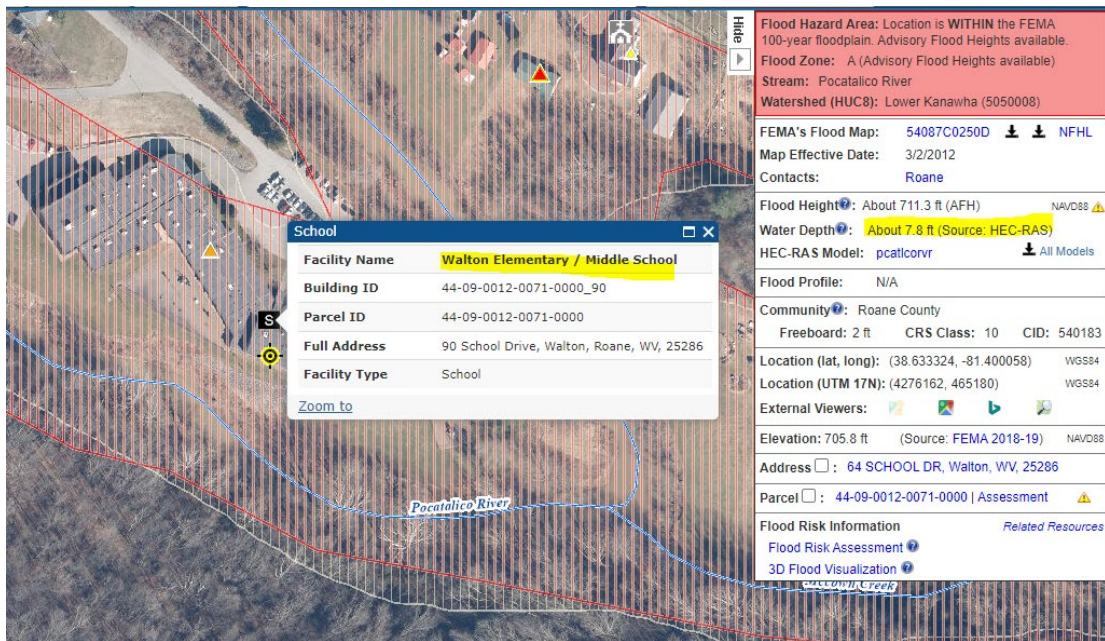
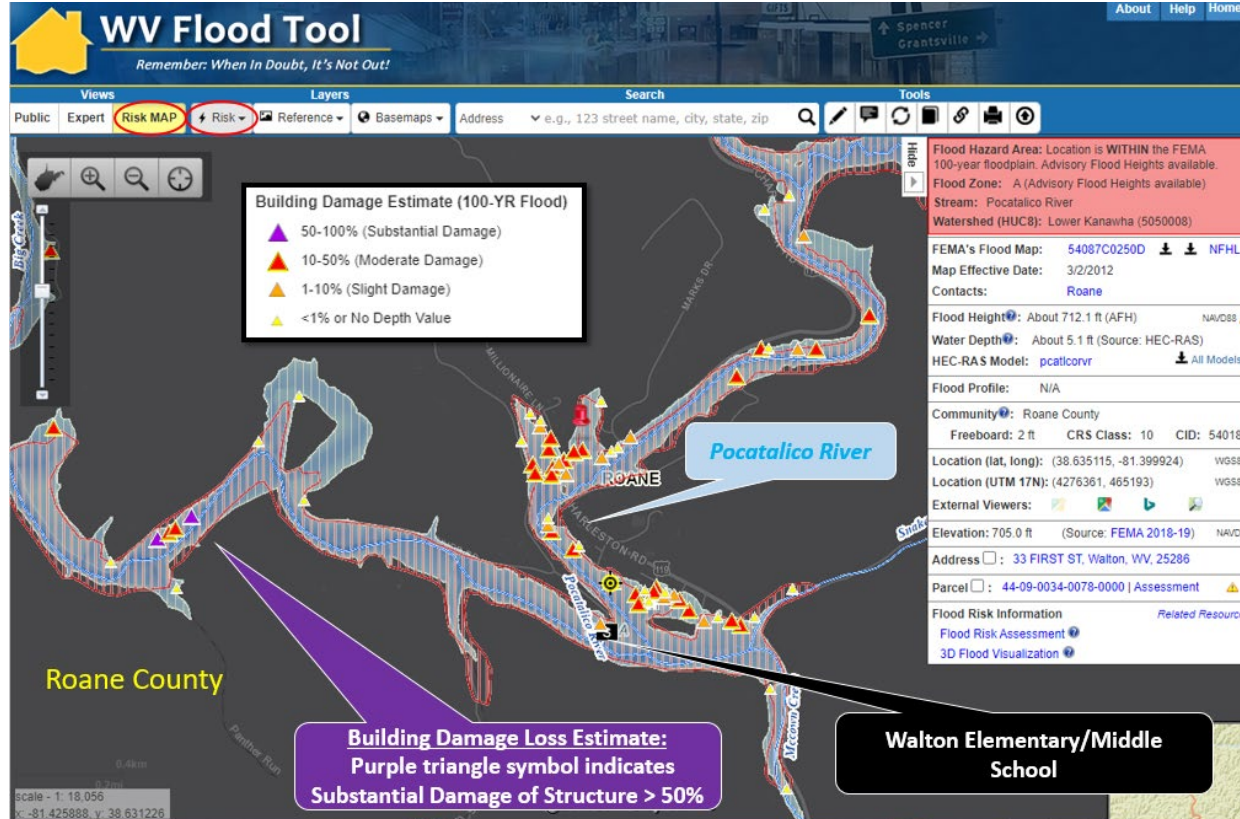
<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9106289&y=4621618&l=10&v=2>



Pocatalico River, Lower Kanawha Watershed, Roane County

Pocatalico River: Highest building dollar exposure of \$6.7M and damage loss estimate of \$867K, primarily because the high-value Walton Elementary/Middle School is located within a 1% flood depth ≥ 5 ft. building cluster; building footprint edge closest to flood source nearly 8-foot flood depth. The cluster of Zone A structures in not adjacent to an existing Zone AE.

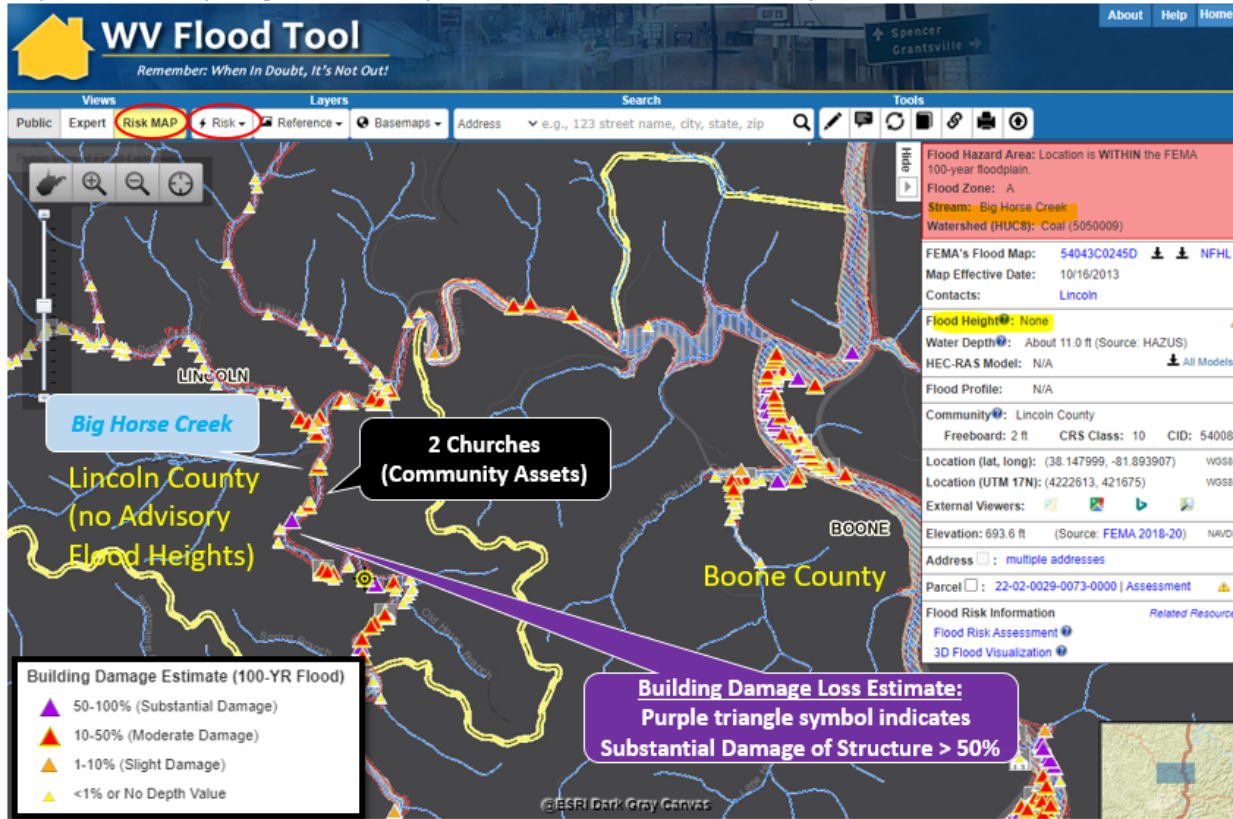
<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9061413&y=4669284&l=8&v=2>



Big Horse Creek, Coal Watershed, Boone County

Big Horse Creek: A longer 5.5 mile reach from Zone AE at the Little Coal River confluence southward to the boundary of Lincoln County. Estimated Zone AE mapping cost of \$13,750. No advisory flood heights or advisory BFEs exist for A Zones in Lincoln County. Only less accurate Hazus flood depth grid available for building-level risk assessment cluster analysis.

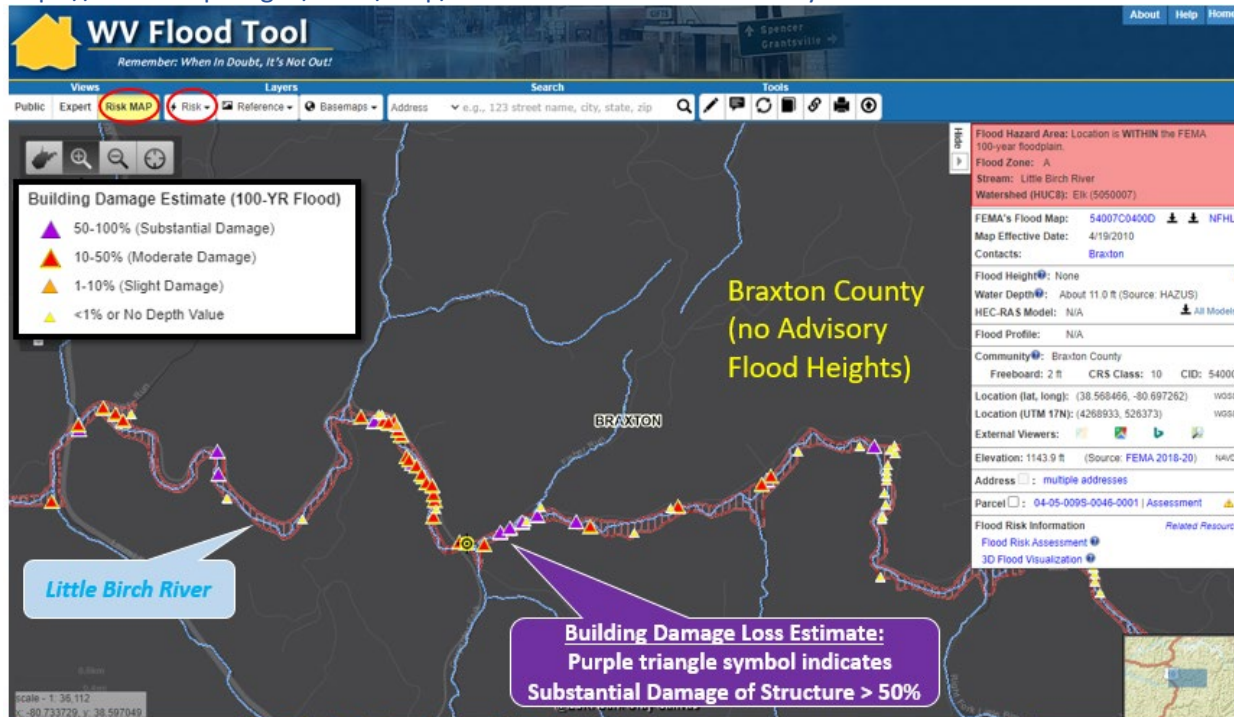
<https://www.mapwv.gov/flood/map/?wkid=102100&x=-9116388&y=4600354&l=7&v=2>



Little Birch River, Elk Watershed, Braxton County

Little Birch River: High cluster number of structures ≥ 5 ft. flood depth (n=28) and building dollar exposure of 1.6 million. Zone A building cluster not adjacent to existing Zone AE and based on less accurate Hazus flood depth grid. Longest building cluster stream reach of 6.0 miles.

<https://www.mapwv.gov/flood/map/?wkid=102100&x=-8983178&y=4660045&l=6&v=2>



Building Damage Estimate (100-YR Flood)

- 50-100% (Substantial Damage)
- 10-50% (Moderate Damage)
- 1-10% (Slight Damage)
- <1% or No Depth Value

Source Documents for Zone A Structure Cluster Analysis: Zone A structure vulnerability and spatial density analyses were performed for three flood depths at ≥ 5 feet and ≥ 10 feet.

- [Zone A Cluster Analysis Graphics](#): Flood Depths for ≥ 5 feet and ≥ 10 feet
- [Spreadsheet Flood Source Tables](#): Summary Building-Level Risk Assessment Factors per River/Stream Cluster and Top Building Flood Depths per River/Stream
- [Report](#): Methodology and map links to potential candidates for AE Zone Detailed Studies
- [BLRA](#): Statewide Building-Level Risk Assessment (BLRA) source geodatabase for cluster analysis

Table 4. Highest Building Flood Depth for Approximate A Zone Rivers/Streams. Sorted on building flood depth. Click on Flood Tool map link to view location.

Stream Name	Watershed	Flood Depth Value (ft.)	Web Link	County	Flood Depth Source	Hazard Occupancy Code	Building Exposure (\$)	Flood Zone Designation
Angel Fork	Coal	14.1	FT	KANAWHA COUNTY	HEC-RAS	RES2	39,700	A
Big Sandy Creek	Elk	11.3	FT	ROANE COUNTY	HEC-RAS	RES1	36,600	A
Crooked Creek	Coal	17.1	FT	KANAWHA COUNTY	HEC-RAS	RES1	90,200	Advisory A
Crooked Creek	Coal	15.1	FT	KANAWHA COUNTY	HEC-RAS	RES1	91,500	A
Crooked Creek	Coal	12.1	FT	KANAWHA COUNTY	HEC-RAS	RES2	45,700	Advisory A
Crooked Creek	Coal	12.0	FT	KANAWHA COUNTY	HEC-RAS	RES2	6,500	Advisory A
Crooked Creek	Coal	11.8	FT	KANAWHA COUNTY	HEC-RAS	RES1	22,400	Advisory A
Little Otter Creek	Elk	17.0	FT	BRAXTON COUNTY	Modified	RES1	58,500	A
Marsh Fork	Coal	12.0	FT	RALEIGH COUNTY	HEC-RAS	RES1	26,700	A
Pocatalico Creek	Lower Kanawha	14.1	FT	KANAWHA COUNTY	HEC-RAS	RES1	102,500	A
Pocatalico River	Lower Kanawha	11.4	FT	ROANE COUNTY	HEC-RAS	RES1	49,700	A
Raccoon Creek	Lower Kanawha	11.8	FT	KANAWHA COUNTY	HEC-RAS	RES2	23,700	Advisory A
Right Fork Holly River	Elk	14.0	FT	WEBSTER COUNTY	HAZUS	RES2	39,190	A
West Fork	Coal	14.0	FT	BOONE COUNTY	HEC-RAS	RES1	58,000	A
West Fork	Coal	13.1	FT	BOONE COUNTY	HEC-RAS	RES2	72,500	A
West Fork	Coal	12.4	FT	BOONE COUNTY	HEC-RAS	RES1	15,900	A
West Fork	Coal	11.9	FT	BOONE COUNTY	HEC-RAS	RES2	26,300	A
West Fork	Coal	11.6	FT	BOONE COUNTY	HEC-RAS	RES1	23,600	A
West Fork	Coal	11.4	FT	BOONE COUNTY	HEC-RAS	RES1	29,100	A
West Fork	Coal	11.3	FT	BOONE COUNTY	HEC-RAS	RES1	5,700	A

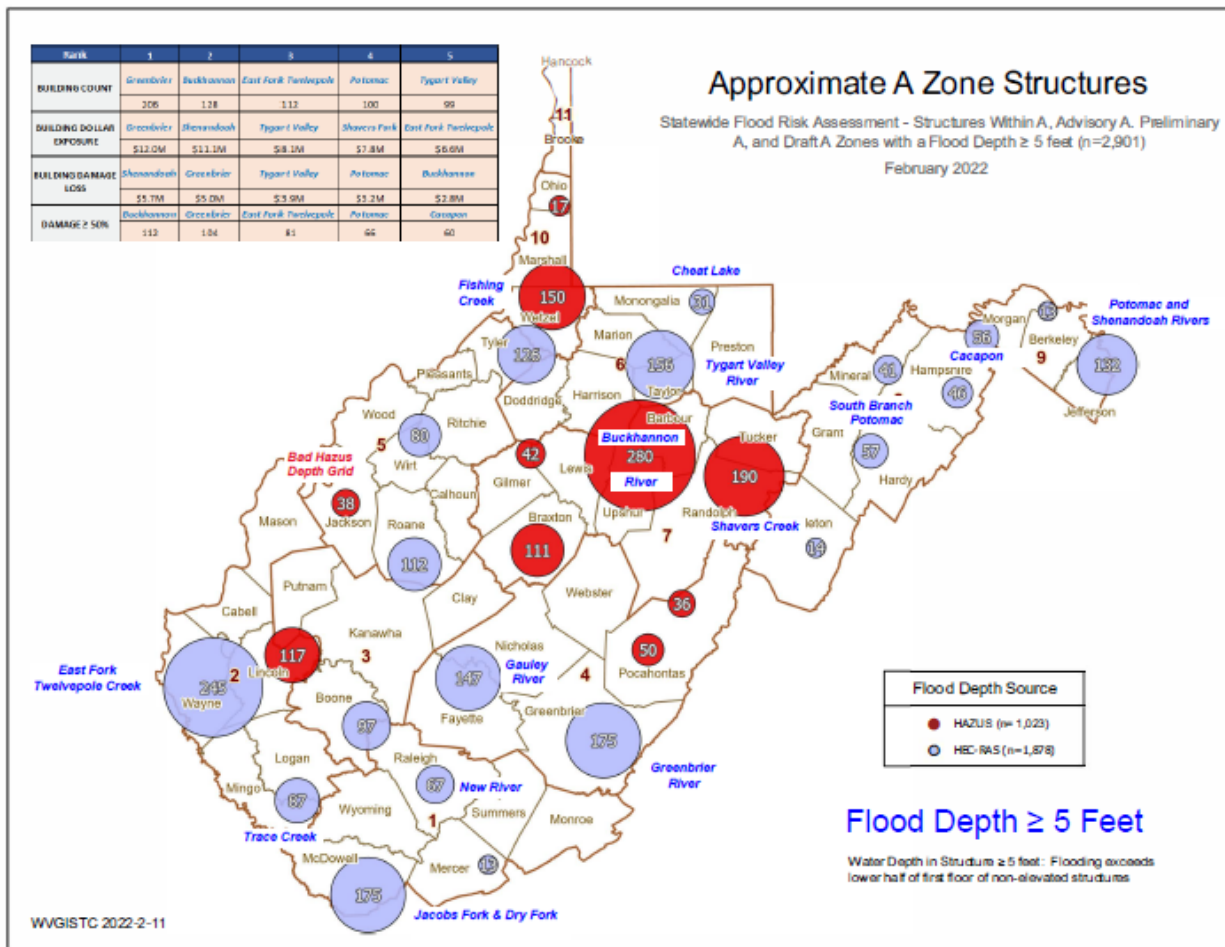
Table 5. Evaluation factor values for Zone A stream reaches to consider for detailed Zone AE conversion

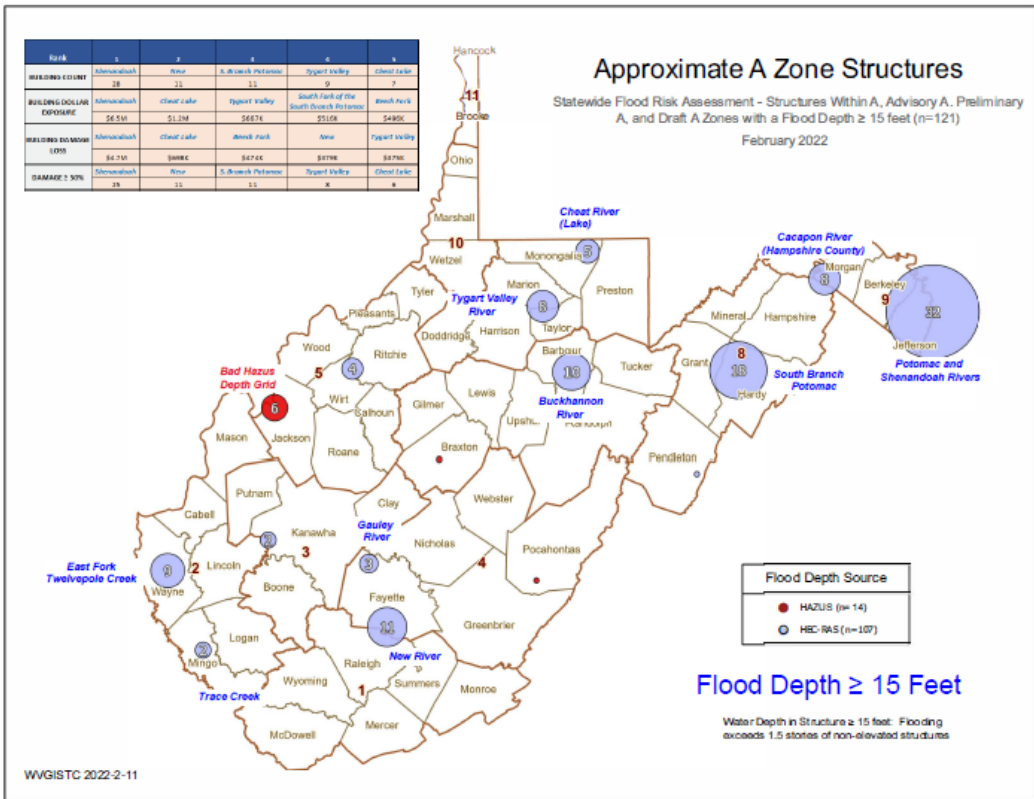
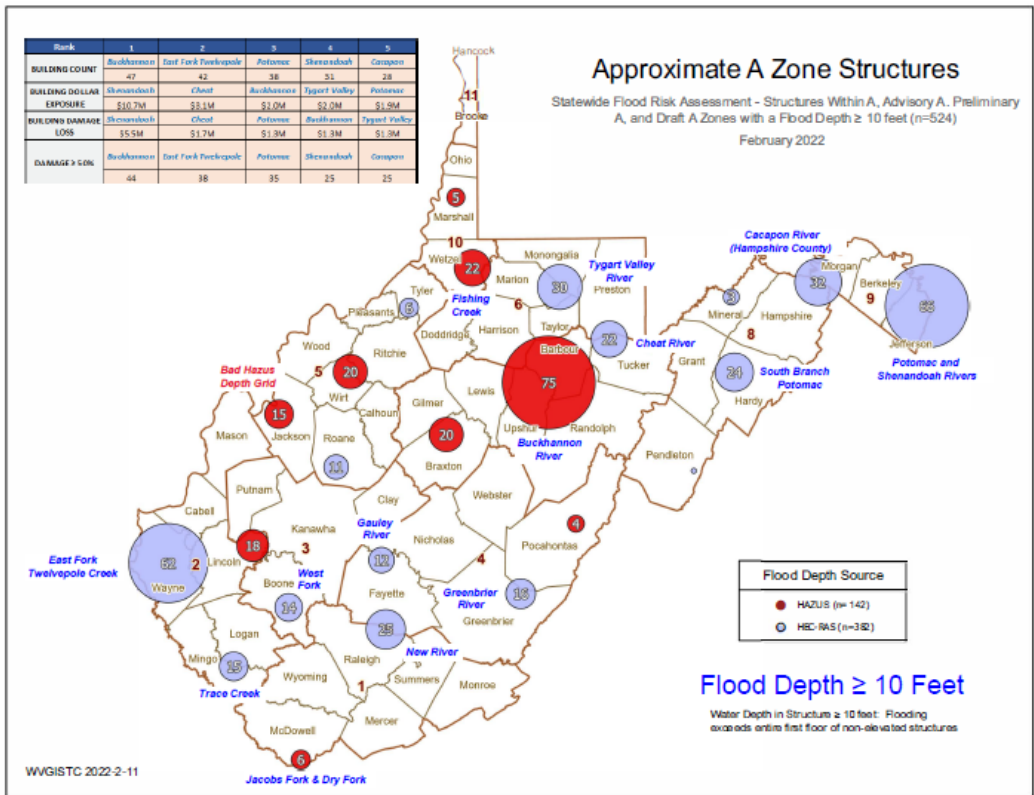
Stream Name	Watershed with A Zone Structures at ≥ 5 ft. Flood Depth	Total Structures	Total Building Exposure (\$)	Total Building Loss (\$)	Structures with Damage ≥ 50%	Structures In CNMS Analysis Area	Notes	Stream Lengths of Potential AE Zones (miles)	Building Density per stream mile	Estimated Zone AE Cost (\$2,500 per mile)
Big Horse Creek	Coal	20	\$778,003	\$264,414	7	0	Boone-Lincoln county Boundary Issue - no AFH for Boone, HAZUS depth grid. Four structures with a flood depth ≥ 10 ft.	5.50	3.6	\$13,750
Crooked Creek	Coal	5	\$256,300	\$192,388	5	0	Also Crooked Creek Tributary. Small distance mileage for mapping AE. Five structures with flood depth > 10 ft.	0.42	11.9	\$1,050
Crooked Creek Tributary No.2	Coal	1	\$93,500	\$57,603	1	0	Part of Crooked Creek	0.09	11.1	\$225
Little Birch River	Elk	28	\$1,612,637	\$683,020	14	0	HAZUS depth grid. Highest building exposure and damage estimates for HAZUS depth grids. Buildings dispersed over longer 6 mile reach. Two structures with a flood depth ≥ 10 ft.	5.99	4.7	\$14,975
Marsh Fork	Coal	31	\$1,448,655	\$415,082	17	0	Raleigh-Boone County boundary issue, Boone: AE zone, Raleigh: A zone. Highest building count and building dollar value for model-backed depth grids. Two structures with a flood depth ≥ 10 ft. Four structures of significance - two essential facilities and two community assets - are located in the building cluster.	2.20	14.1	\$5,500
Pocatalico River	Lower Kanawha	13	\$6,740,850	\$867,449	7	0	Essential Facility: Walton Elem/Middle School - \$6M, Bldg. Loss Estimate \$550K (underestimated based on selected site flood depth, flood depth estimates as high as 8 ft.), not adjacent to a detailed AE zone. Four structures with a flood depth ≥ 10 ft.	3.28	4.0	\$8,200
West Fork	Coal	21	\$681,790	460,205	20	17	Twelve structures with flood depth > 10 ft.; Cluster of properties in high base flood depth areas with a potential of substantial flood damage; candidate area to consider an AE study; only CNMS record in Kanawha River Basin. Highest damage estimates and high flood depths for model-backed depth grids.	0.95	22.1	\$2,375

Appendix A: Statewide Analysis - Zone A Structure Cluster Analysis

Zone A Structure Cluster Analysis: Zone A structure vulnerability and spatial density analyses were performed for three flood depths at ≥ 5 feet, ≥ 10 feet, and ≥ 15 feet. West Fork of the Coal Watershed was discovered as part of the statewide analysis. Statewide analysis performed February 2022.

- [Zone A Cluster Analysis Graphics](#): Flood Depths for ≥ 5 feet, ≥ 10 feet, and ≥ 15 feet
- [Spreadsheet Flood Source Tables](#): Summary Building-Level Risk Assessment Factors per River/Stream Cluster and Top Building Flood Depths per River/Stream
- [Report](#): Methodology and map links to potential candidates for AE Zone Detailed Studies
- [BLRA](#): Statewide Building-Level Risk Assessment (BLRA) source geodatabase for cluster analysis





Statewide Findings: Refer to the graphics, spreadsheet table, and WV Flood Tool when evaluating the TEIF data for this analysis. Analysis performed February 2022.

Flood Depth ≥ 5 Feet

Approximate A Zone Structures with **Flood Depth ≥ 5 Feet**. Water Depth in Structure ≥ 5 feet: Flooding exceeds lower half of first floor of non-elevated structures.

- **Greenbrier River:** Greenbrier River in Greenbrier County is ranked first as having the highest Building Count (206) and Building Dollar Exposure (\$12M). Greenbrier River is ranked second for Building Damage Loss Estimate (\$5.0M) and Substantially Damaged Structures Estimate (104)
- Other Rivers/Streams of Interest: **Buckhannon, East Fork Twelvepole, Potomac, Tygart Valley, Shenandoah, Shavers Fork, Cacapon, and West Fork.**

Flood Depth ≥ 10 Feet

Approximate A Zone Structures with **Flood Depth ≥ 10 Feet**. Water Depth in Structure ≥ 10 feet: Flooding exceeds entire first floor of non-elevated structures.

- **Buckhannon River:** Buckhannon River in Barbour and Upshur counties is ranked first with the highest Building Count (47) and Substantially Damaged Loss Estimate (44).
- **Shenandoah River** (Harpers Ferry): Shenandoah River is ranked first in Building Dollar Exposure (\$10.7M) and Building Damage Loss Estimate (\$5.5M).
- Other Rivers/Streams of Interest: **East Fork Twelvepole, Potomac, Cacapon, Cheat, Tygart Valley, and West Fork.**

Flood Depth ≥ 15 Feet

Approximate A Zone Structures with **Flood Depth ≥ 15 Feet**. Water Depth in Structure ≥ 15 feet: Flooding exceeds 1.5 stories of non-elevated structures.

- **Shenandoah River** (Harpers Ferry): Shenandoah River is ranked first in all risk factors: Building Count (28), Building Dollar Exposure (\$6.5M), Building Damage Loss Estimate (\$4.7M), and Substantially Damaged Loss Estimate (25).
- Other Rivers/Streams of Interest: **New, South Branch Potomac, Tygart Valley, Cheat Lake, South Fork of the South Branch Potomac, and Beech Fork.**

Appendix B: Differences in Specifications & Costs for AE and A Zones

Specifications: Detailed Studies versus Approximate A Studies

- Detailed studies use more refined hydrologic modeling in a lot of cases instead of just using regression equations.
- Detailed studies includes floodway and a hydraulic model with structure survey and bathymetric survey.
- Detailed studies have extra FEMA products such as a “floodway data table” and “flood profiles” in the FIS reports.
- FEMA can’t publish BFE’s on their products unless it is “a detailed study” per federal regulations. Consequently, FEMA utilizes States’ websites to display BFE’s for Approximate A Zones.

Price Differences: Detailed Studies versus Approximate A Studies

- Prices are different for every company. Approximately \$300 per Zone A mile and \$2,500 per Zone AE mile.
- Zone AE costs have come down in price much in the last 10 years.

Source: Personal communications, FEMA Region III